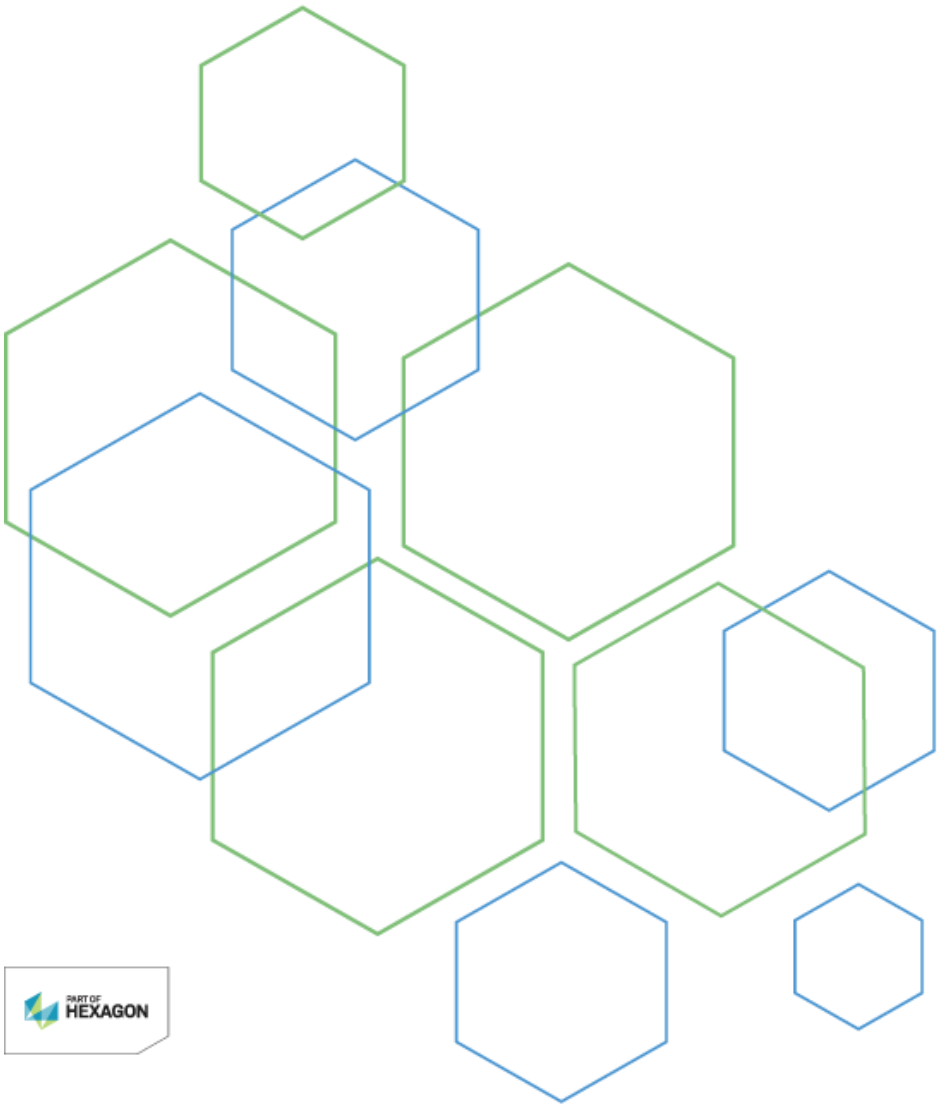
INTERGRAPH Smart 3D

Hole Management

User's Guide



PART OF HEXAGON

Version 2016 (11.0)
November 2016

Copyright

U.S. Government Restricted Rights Legend

Intergraph Corporation
305 Intergraph Way
Madison, AL 35758

Documentation

Documentation shall mean, whether in electronic or printed form, User's Guides, Installation Guides, Reference Guides, Administrator's Guides, Customization Guides, Programmer's Guides, Configuration Guides and Help Guides delivered with a particular software product.

Other Documentation

Other Documentation shall mean, whether in electronic or printed form and delivered with software or on Intergraph Smart Support, SharePoint, or box.net, any documentation related to work processes, workflows, and best practices that is provided by Intergraph as guidance for using a software product.

Terms of Use

a. Use of a software product and Documentation is subject to the End User License Agreement ("EULA") delivered with the software product unless the Licensee has a valid signed license for this software product with Intergraph Corporation. If the Licensee has a valid signed license for this software product with Intergraph Corporation, the valid signed license shall take precedence and govern the use of this software product and Documentation. Subject to the terms contained within the applicable license agreement, Intergraph Corporation gives Licensee permission to print a reasonable number of copies of the Documentation as defined in the applicable license agreement and delivered with the software product for Licensee's internal, non-commercial use. The Documentation may not be printed for resale or redistribution.

b. For use of Documentation or Other Documentation where end user does not receive a EULA or does not have a valid license agreement with Intergraph, Intergraph grants the Licensee a non-exclusive license to use the Documentation or Other Documentation for Licensee's internal non-commercial use. Intergraph Corporation gives Licensee permission to print a reasonable number of copies of Other Documentation for Licensee's internal, non-commercial use. The Other Documentation may not be printed for resale or redistribution. This license contained in this subsection b) may be terminated at any time and for any reason by Intergraph Corporation by giving written notice to Licensee.

Disclaimer of Warranties

Except for any express warranties as may be stated in the EULA or separate license or separate terms and conditions, Intergraph Corporation disclaims any and all express or implied warranties including, but not limited to the implied warranties of merchantability and fitness for a particular purpose and nothing stated in, or implied by, this document or its contents shall be considered or deemed a modification or amendment of such disclaimer. Intergraph believes the information in this publication is accurate as of its publication date.

The information and the software discussed in this document are subject to change without notice and are subject to applicable technical product descriptions. Intergraph Corporation is not responsible for any error that may appear in this document.

The software, Documentation and Other Documentation discussed in this document are furnished under a license and may be used or copied only in accordance with the terms of this license. THE USER OF THE SOFTWARE IS EXPECTED TO MAKE THE FINAL EVALUATION AS TO THE USEFULNESS OF THE SOFTWARE IN HIS OWN ENVIRONMENT.

Intergraph is not responsible for the accuracy of delivered data including, but not limited to, catalog, reference and symbol data. Users should verify for themselves that the data is accurate and suitable for their project work.

Limitation of Damages

IN NO EVENT WILL INTERGRAPH CORPORATION BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL INCIDENTAL, SPECIAL, OR PUNITIVE DAMAGES, INCLUDING BUT NOT LIMITED TO, LOSS OF USE OR PRODUCTION, LOSS OF REVENUE OR PROFIT, LOSS OF DATA, OR CLAIMS OF THIRD PARTIES, EVEN IF INTERGRAPH CORPORATION HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

UNDER NO CIRCUMSTANCES SHALL INTERGRAPH CORPORATION'S LIABILITY EXCEED THE AMOUNT THAT INTERGRAPH CORPORATION HAS BEEN PAID BY LICENSEE UNDER THIS AGREEMENT AT THE TIME THE CLAIM IS MADE. EXCEPT WHERE PROHIBITED BY APPLICABLE LAW, NO CLAIM, REGARDLESS OF FORM, ARISING OUT OF OR IN CONNECTION WITH THE SUBJECT MATTER OF THIS DOCUMENT MAY BE BROUGHT BY LICENSEE MORE THAN TWO (2) YEARS AFTER THE EVENT GIVING RISE TO THE CAUSE OF ACTION HAS OCCURRED.

IF UNDER THE LAW RULED APPLICABLE ANY PART OF THIS SECTION IS INVALID, THEN INTERGRAPH LIMITS ITS LIABILITY TO THE MAXIMUM EXTENT ALLOWED BY SAID LAW.

Export Controls

Intergraph Corporation's software products and any third-party Software Products obtained from Intergraph Corporation, its subsidiaries, or distributors (including any Documentation, Other Documentation or technical data related to these products) are subject to the export control laws and regulations of the United States. Diversion contrary to U.S. law is prohibited. These Software Products, and the direct product thereof, must not be exported or re-exported, directly or indirectly (including via remote access) under the following circumstances:

a. To Cuba, Iran, North Korea, Sudan, or Syria, or any national of these countries.

b. To any person or entity listed on any U.S. government denial list, including but not limited to, the U.S. Department of Commerce Denied Persons, Entities, and Unverified Lists, http://www.bis.doc.gov/complianceandenforcement/liststocheck.htm, the U.S. Department of Treasury Specially Designated Nationals List, http://www.treas.gov/offices/enforcement/ofac/, and the U.S. Department of State Debarred List, http://www.pmddtc.state.gov/compliance/debar.html.

c. To any entity when Licensee knows, or has reason to know, the end use of the Software Product is related to the design, development, production, or use of missiles, chemical, biological, or nuclear weapons, or other un-safeguarded or sensitive nuclear uses.

d. To any entity when Licensee knows, or has reason to know, that an illegal reshipment will take place.

Any questions regarding export or re-export of these Software Products should be addressed to Intergraph Corporation's Export Compliance Department, Huntsville, Alabama 35894, USA.

Trademarks

Contents

Preface

This document is a user's guide for the Hole Management functionality of Intergraph Smart™ 3D and provides command reference information and procedural instructions.

Documentation Comments

For the latest support information for this product, comments or suggestions about this documentation, and documentation updates for supported software versions, please visit *Intergraph Smart Support* (*https://smartsupport.intergraph.com*).

What's New in Hole Management

The following changes have been made to the Hole Management task.

Version 2016 (11.0)

- The **Delete Optional** property in **Model Data Transform** now supports hole entities. (P1 CP:266398)
- Added a new locate filter, **Construction Graphics**. For more information, see *Selecting Objects* (on page 11). (P2 CP:271166)
- Added the **Maintain the relationships on the plane with its definition method** property to the Sketch Options ribbon for the **Hole Fitting** and **Hole Cut and Fitting** commands. For more information, see *Hole Fitting* (on page 57) and *Hole Cut and Fitting* (on page 65). (P4 CP:294900)
- Added **Martyr** to the design properties for single and multiple holes. For more information, see *Single Hole* (on page 27) and *Multiple Holes* (on page 45). (P4 CP:294900)
- The **Outfitting Part Name** property displays the name of the outfitting part. For more information, see *Hole Tab (Hole Trace Properties Dialog Box)* (on page 38). (P4 CP:294900)

SECTION 1

Hole Management

The Hole Management task places holes in structures (Molded Forms objects, Structural Detailing plates and profiles, slabs, walls, and member parts) for outfitting parts such as pipes, ducts, cables, and equipment that penetrate the structure. The holes are associated with the structure and the penetrating part so that if either one is modified, the hole is automatically adjusted by the software. Reinforcing structures, such as coamings, flanges, and doubler plates, can also be placed and associated with the hole.

The Hole Management task contains these commands:

Select - Selects objects in the model so you can manipulate or modify them. For more information, see *Selecting Objects* (on page 11).

Single Hole - Creates a single hole trace in a structural part for one or more selected penetrating outfitting parts. For more information, see *Single Hole* (on page 27)

Multiple Holes - Creates all the needed individual hole traces for one or more selected structural parts or outfitting parts. For more information, see *Multiple Holes* (on page 45).

Cut Hole - Cuts a hole in the structural part for one or more selected hole traces. The structural part must first be detailed in the Structural Detailing task. For more information, see *Cut Hole* (on page 52).

Hole Fitting - Places a fitting, such as a coaming or a flange, around a hole cut for a selected hole trace. For more information, see *Hole Fitting* (on page 57).

Hole Cut and Fitting - Cuts a hole in the structural part and places a fitting around the hole cut for a selected hole trace. For more information, see *Hole Cut and Fitting* (on page 65).

Manage Holes - Queries the status of holes in the workspace. This command is also available on the **View** menu (in that location, the command is called **Hole Management**). For more information, see *Manage Holes* (on page 72).

Check Holes - Checks the holes in the workspace for manufacturability. This command is located on the **Tools** menu. For more information, see *Check Manufacturability* (on page 75).

See Also

Hole Management Common Tasks (on page 8)
Hole Management Workflow (on page 8)

SECTION 2

Hole Management Workflow

The typical Hole Management workflow is designed to work in conjunction with permission groups and multiple global workshare databases created in the Project Management task. Structural users and outfitting users usually have read permission to each other's objects.

Outfitting users start the hole creation process by placing hole traces on structure where the structure is penetrated by equipment and distributed systems. The outfitters place hole traces in the model using the **Single Hole** or **Multiple Holes** commands. Outfitting users can also place the fitting before the hole is cut by selecting a catalog fitting in the **Hole Fitting** command. Catalog fittings are fixed in size.

NOTES

- Both the **Single Hole** and **Multiple Holes** commands exclude equipment that does not have the *hole aspect*.
- For designed equipment, a nozzle is required so that Hole Management can orient the equipment when creating the hole trace.

Structure users cut the hole in the structure using the **Cut Hole** command. Structure users can also place the fitting using the **Hole Fitting** command if the fitting is a structural fitting. Structural fittings are calculated based on the size of a hole cut, similar to edge reinforcements in the Molded Forms and Structural Detailing tasks. The hole cut and fitting can also be placed at the same time using the **Hole Cut and Fitting** command.

The **Manage Holes** command is used to view a list of hole traces and hole trace attributes, such as the name of the structural part and the existence of fittings and hole cuts.

NOTE If a simplified workflow is needed, an outfitting user with write access to the structure can create the actual hole cut in the structure.

See Also

Hole Management Common Tasks (on page 8)
Permission Group Behaviors Between Tasks (on page 17)
Hole Management (on page 7)
Selecting Objects (on page 11)

Hole Management Common Tasks

The following tasks are used frequently in the Hole Management task.

Place Hole Traces

Create hole traces at the intersection of one or more outfitting parts and structural parts:

- To have the software automatically generate one hole trace for one or more outfitting parts penetrating one structural part, see *Place single hole trace* (on page 31).
- To manually sketch one hole trace for one or more outfitting parts penetrating one structural part, see *Place single hole trace by sketching* (on page 33).

Place holes at all the intersections of the selected object and other objects:

- To have the software automatically generate hole traces for all outfitting parts that penetrate the selected structural parts, see *Place multiple hole traces in structure* (on page 48).
- To have the software automatically generate hole traces in every structural part that the selected outfitting parts penetrate, see *Place multiple hole traces for outfitting parts* (on page 49).

Place Hole Cuts

Create hole cuts on existing hole traces. To generate hole cuts at the selected hole traces, see *Place a hole cut* (on page 53).

Place Hole Fittings

Create hole fittings on existing hole traces.

- To have the software automatically generate a hole fitting at the selected hole trace, see *Place a hole fitting using rules* (on page 61).
- To manually select a catalog hole fitting at the selected hole trace, see *Place an outfitting catalog hole fitting* (on page 62).
- To manually select a structural fitting at the selected hole trace, see *Place a structural hole fitting* (on page 62).

Place Hole Cuts and Hole Fittings at the Same Time

Create hole cuts and hole fittings at the same time on existing hole traces.

- To generate a hole cut and have the software automatically generate a hole fitting at the selected hole trace, see *Place a hole cut and hole fitting using rules* (on page 68).
- To generate a hole cut and manually select a catalog hole fitting at the selected hole trace, see *Place a hole cut and an outfitting catalog hole fitting* (on page 69).
- To generate a hole cut and manually select a structural fitting at the selected hole trace, see *Place a hole cut and structural hole fitting* (on page 71).

View a List of Hole Traces

Query the status of hole traces in the workspace and displays hole trace attributes and relationships. To view the list, see *Manage Holes* (on page 72).

Check Holes for Manufacturability

Check holes for possible manufacturing problems. To run the check, see *Check Manufacturability* (on page 75) for manufacturability.

Selecting Objects

All objects in the Hole Management task have properties that you can edit. Using the **Select** command on the vertical toolbar, you select the object that you want to edit.

An important part of the **Select** command is the **Locate Filter** box that appears on the ribbon. The **Locate Filter** box contains the available, pre-defined filters for the **Select** command. When you choose a filter in the **Locate Filter** box, the software allows you to select only the filtered objects in a graphic view and in the **Workspace Explorer**. For example, if you select **Holes**, you can select only hole traces in a graphic view or in the **Workspace Explorer**.

The Hole Management task includes these filters:

Construction Graphics

Limits the selection of items to construction graphics.

Holes

Allows you to select hole traces in a graphic view and in the **Workspace Explorer**. Other objects, such as equipment, cannot be selected using this filter.

Hole Features

Allows you to select hole cuts in a graphic view and in the **Workspace Explorer**. Other objects, such as equipment, cannot be selected using this filter.

Hole Fittings

Allows you to select hole fittings in a graphic view and in the **Workspace Explorer**. Other objects, such as equipment, cannot be selected using this filter.

All Objects

Allows you to select any object, even objects created in another task. Use this filter to select hole fittings.

Use the **Inside Fence** command to select all objects entirely inside the fence.

Use the **Overlapping fence** command to select all objects entirely inside the fence and those objects outside but touching the fence at some point.

See Also

Hole Management Workflow (on page 8)

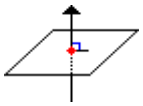
Plane Methods

You must often define planes used for object surfaces and sketching planes. Usually, but not necessarily, these planes are based from an existing plate or from a grid or reference plane created using the Grids task. The following methods define planes:

Offset from Plane

Defines a plane at a specified offset distance from another plane. An offset distance of **0** defines a coincident plane.

Plane by Point and Vector



Defines a plane using a vector normal to the plane being defined. A third point defines the plane position along the vector.

Plane by Three Points

Defines a plane using three points that you identify in the model.

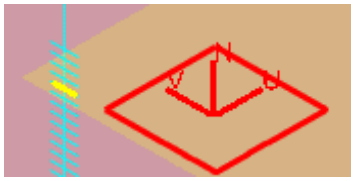
What do you want to do?

- *Define a coincident plane* (on page 12)
- *Define an offset plane* (on page 13)
- *Define a plane using a point and a normal vector* (on page 14)
- *Define a plane using three points* (on page 16)
- Move a defined plane

Define a coincident plane

1. Click **Offset from a Plane** .
2. In the model or **Workspace Explorer**, select a reference plane, a grid plane, or a planar plate system.

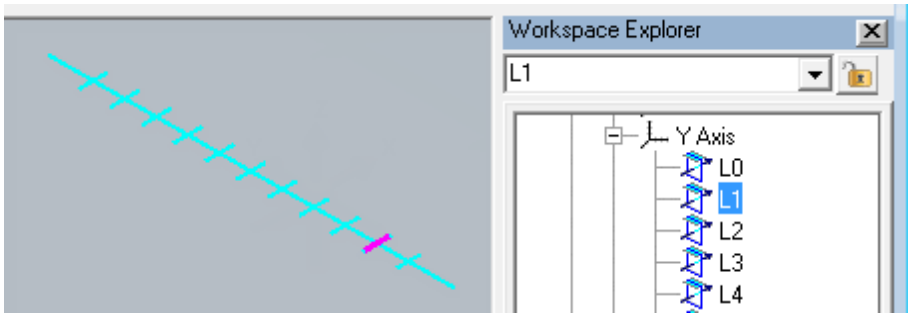
   A preview of the selected plane displays. The local coordinate system of the plane displays at the plane's center.



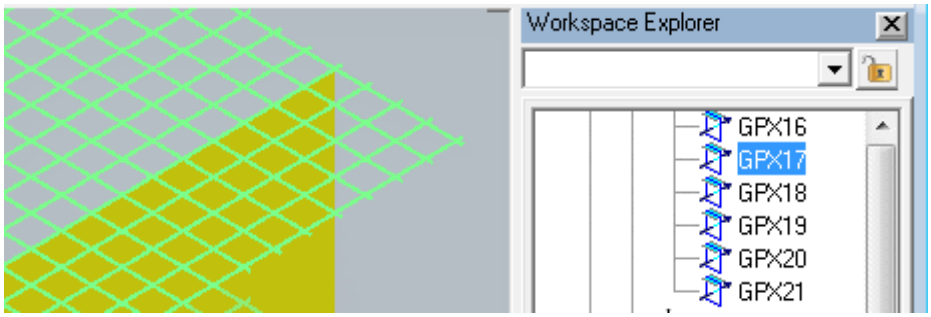
3. Check that **Offset Lock** is locked and that the **Offset** value is 0.

NOTES

- You create reference planes in the Grids task by selecting **Ship** in the **Grid Type** box of the **Grid Wizard**. For this plane method, you can select reference planes in the **Workspace Explorer** or in a graphic view.



- You create grid planes in the Grids task by selecting **Grids** in the **Grid Type** box of the **Grid Wizard**. For this plane method, you can best select grid planes in the **Workspace Explorer**.

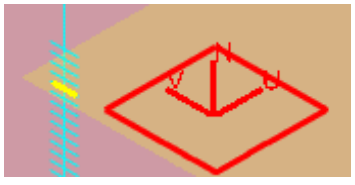


- For more information, see *Create Coordinate System (Grid Wizard)* in the *Grids User's Guide*.

Define an offset plane

1. Click **Offset from a Plane**.
2. In the model or **Workspace Explorer**, select the base plane from which to offset the new plane. The base plane can be a reference plane, a grid plane, or a planar plate system.

   A preview of the selected plane displays. The local coordinate system of the plane displays at the plane's center.



3. In the **Offset** box, type the offset distance from the plane and press TAB.

   The plane moves to the new location.

   -OR-

4. Graphically define the offset:
   a. Click **Offset Lock** .

      The option changes to unlocked .

   b. Move the pointer to the required location and click.

      The plane and plane coordinate system move to the new location, ***Offset Lock*** *changes to locked , and the offset value displays in the* ***Offset*** *box.*

   c. If an adjustment to the offset is needed, type a new value in the **Offset** box.
5. To move the plane independent of its previous definition, see Move a defined plane.

TIPS

- You can graphically define the offset with the best precision by also using **PinPoint**. For more information, see *PinPoint* in the *Common User's Guide*.
- By moving the pointer back and forth over the base plane in the graphic view, you can change the offset direction. You can also change the direction by changing the sign in the **Offset** box.
- When **Offset Lock** is set to locked , the **Offset** value does not change when the pointer moves.

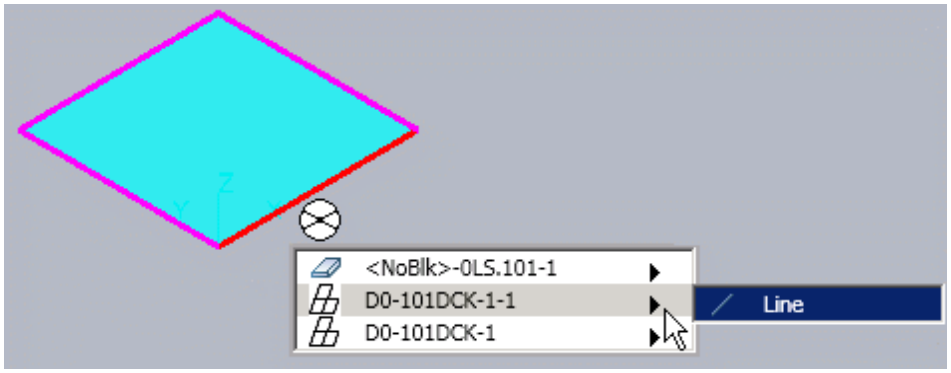
Define plane using angle from plane

1. Click **Angle from Plane** .
2. In the model or **Workspace Explorer**, select the base plane from which to angle the plane that you are defining. This plane can be a planar plate system, face port of a plate port, or a grid plane.
3. Select a rotation axis. The rotation axis must be parallel to the surface of the selected plane.

   TIP The rotation axis can be a linear seam, profile system, landing curve, system edge or connection.
4. In the **Angle** box, specify the rotation angle of the plane relative to the selected base plane.

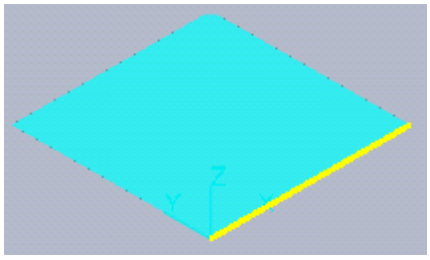
Define a plane using a point and a normal vector

1. Click **Plane by Point and Vector** .
2. Select a vector in the model that is normal to the required plane. The vector can be any linear geometry that is part of the construction of a model object, such as a plate system edge or a profile system landing curve. Use **QuickPick** to select a line geometry element.



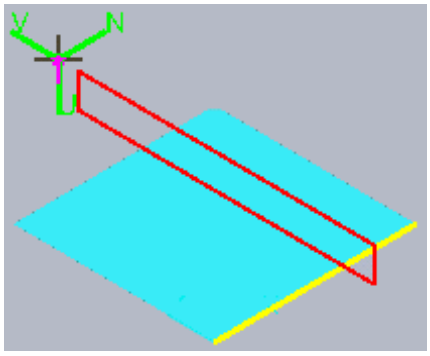
3. Click the **Line** geometry element.

   The selected geometry highlights in yellow.



4. Move the cursor to a point that is on the required plane, and then click.

   A preview of the plane and its local U_V_N coordinate system displays. The plane is coincident with the point and normal to the vector.



5. To move the plane independent of its previous definition, see Move a defined plane.

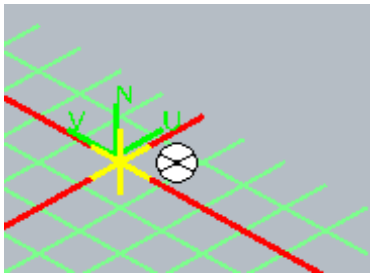
TIP You can graphically define the point with the best precision by also using **PinPoint**. For more information, see *PinPoint* in the *Common User's Guide*.

Define a plane using three points

1. Click **Plane by Three Points** .
2. Specify on the first point that defines the plane.
3. Specify the second point that defines the plane.
4. Specify the third point that defines the plane.

NOTES

- You can define points on the surfaces, edges, and corners of systems and parts. You can control the types of points by using **Tools** > **Options**. For more information, see *SmartSketch Tab (Options Dialog Box)* in the *Common User's Guide*.
- You can define points on grid planes, especially at intersections.



You can control the types of points using **Tools** > **Options**. For more information, see *SmartSketch Tab (Options Dialog Box)* in the *Common User's Guide*.

In Molded Forms, define parametric points by using **Insert** > **Topological Points**. For more information, see Topological Points (Insert Menu).

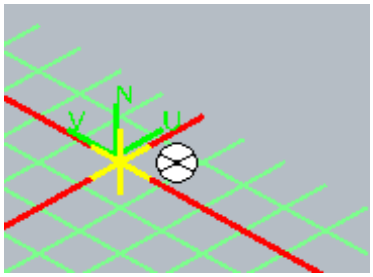
Define plane by vectors normal

1. Click **Plane by Vectors Normal** .
2. In the model or **Workspace Explorer**, click the plane to which the new plane is normal.

   TIP The plane can be a planar plate system, a face port of a plate part, or a grid plane.
3. Specify the first point that defines the vector.
4. Specify the second point that defines the vector.

NOTES

- You can define points on the surfaces, edges, and corners of systems and parts. You can control the types of points by using **Tools** > **Options**. For more information, see *SmartSketch Tab (Options Dialog Box)* in the *Common User's Guide*.
- You can define points on grid planes, especially at intersections.

  You can control the types of points using **Tools** > **Options**. For more information, see *SmartSketch Tab (Options Dialog Box)* in the *Common User's Guide*.
- In Molded Forms, define parametric points by using **Insert** > **Topological Points**. For more information, see Topological Points (Insert Menu).

Permission Group Behaviors between Tasks

Permission groups provide controls for when, where, and by whom the model can be updated. Permission groups are assigned according to several common types of workflow. They typically fall into the following categories:

- By Function: such as Outfitting versus Structure, or Piping versus Equipment versus Molded Forms versus Structural Detailing.
- By System: such as Hull versus Deck1 versus TransvBhd1. This includes the ability to place the hull system (and its child leaf systems, seams, connections related seams, reference curves and openings) in a different permission group than the hull detailing objects and other connected objects.
- By Area: Fwd versus Aft, or by block or assembly.
- Combinations: for example, By Function and By Area (Molded Forms for Block1 versus Detailing for Block1).

The permission group of an object is not modified regardless of the **Active Permission Group** unless the permission group is explicitly changed on the **Configuration** tab of the **Properties** dialog box as described under the change propagation sections below.

Molded Forms Behavior

Plate systems and profile systems are assigned to the **Active Permission Group**.

Leaf systems, light parts, reference curves, and logical connections are assigned the permission group of their parent.

Seams and openings are assigned to the permission group of the plate or profile system they cut. You must have write access to the root plate system being cut when placing an opening or design seam.

In the **Execute Split** command, seams and knuckles that you do not have permission to modify are not selectable in the table.

Logical connections between profile systems and plate systems are in same permission group as the profile systems.

Logical connections between different root systems are created as children of the bounded or penetrated system.

Summary of Molded Forms permission behaviors:

Object	Permission Group	Comments
Root plate system	Active Permission Group	
Leaf plate system	Same as root plate system	
Root and child logical connections	Same as dependent root plate system	
Reference curve	Same as root plate system	
Design seam, intersection seam	Same as root plate system	Must have write access to root plate system
Opening	Same as root plate system	Must have write access to root plate system
Manual logical connection	Permission group of system for which you have write access, use first system selected if you have write access to both systems	Must have write access to at least one of the systems being connected
Root profile system	Active Permission Group	Profiles are handled similarly to plates
Logical connection between stiffener or edge reinforcement and the plate being stiffened	Same permission group as root profile system	
Beam	Active Permission Group	

Molded Forms Change Propagation

The root system and its child leaf system, logical connections, reference curves, seams and openings always have the same permission group. When the permission group is changed for any of these objects, the permission group is also changed for the other objects.

If plate system A is bounded by plate system B, you can modify A without write access to B. Plate System B is placed on the **To Do List** as **Out of Date** if the change to A impacts B.

Structural Detailing Behavior

The detailed part permission group is not assigned from the parent system permission group. Detailed parts created with **Execute Detailing** are assigned to the **Active Permission Group**. You can modify this assignment. You must have write permission to the part to detail the part.

If a detailed part is deleted, the resulting light part maintains the permission group of the detailed part.

You can assign different permission groups to parts sharing the same leaf system as created by a planning seam.

You can only add seams and features to a part if you have write permissions to the part.

Summary of Structural Detailing permission behaviors:

Object	**Permission Group**	**Comments**
Light Root Plate Part (before detailing)	Same as plate system at creation	
Detailed Root Plate Part	Active Permission Group when detailed. Part keeps this permission group if the detail part is deleted.	Must have write access to the light part
Leaf part	Same as root part	
Straking seam	Same as root part	Must have write access to root part
Feature placed by command (edge, corner, sketched, free edge treatment)	Same as root part	Must have write access to root part
Assembly Connection	Same as dependent part	
Feature, part, physical connection created by assembly connection	Same as assembly connection	
Free end cut object and its features	Same as root part	
Standalone part	Active Permission Group	

Structural Detailing Change Propagation

The detailed part, its child leaf parts, features and straking seams always have the same permission group. Assembly connections always have the same permission group as the dependent part in the connection. Assembly connection children always have the same permission group as the assembly connection. Standalone parts plus associated features and connections always have the same permission group. When the permission group is changed for any of these objects, the permission group is also changed for the other objects.

If you do not have write access to a part, the part is placed on the **To Do List** as **Out of Date** if a change is made to the part. Assembly connections and features are also not created until the part is updated on the **To Do List** by someone with write access.

Hole Management Behavior

Hole traces and outfitting catalog hole fittings are assigned to the **Active Permission Group**.

Hole cuts and structural hole fittings are assigned the permission group of their parent structural part (plate or profile).

Summary of Hole Management permission behaviors:

Object	**Permission Group**	**Comments**
Hole trace	Active Permission Group	
Hole cut	Same as root plate part	Must have write access to parent plate part. Root plate part must be detailed in the Structural Detailing task.
Outfitting catalog hole fitting	Active Permission Group	
Structural hole fitting	Active Permission Group	Must have write access to parent plate part. Root plate part must be detailed in the Structural Detailing task.

Hole Management Change Propagation

The permission group of an outfitting catalog hole fitting can be changed without changing the permission group of the hole trace.

The permission group of a structural hole fitting can be changed without changing the permission group of the hole cut or parent plate part.

A hole cut and its parent plate part always have the same permission group. When the permission group is changed for one of these objects, the permission group is also changed for the other object.

Planning Behavior

Planning permission group behavior is related to Molded Forms and Structural Detailing behavior because planning seams split leaf systems.

When **Manage Intersections** is run and an intersecting part is set to **Split** or **Offset**, planning seams are created in the **Active Permission Group**. You must have write access to the root system.

Summary of Planning permission behaviors:

Object	Permission Group	Comments
Planning seam	Active Permission Group	Must have write access to the root system of the parts being split.
Block or assembly	Active Permission Group	

Planning Change Propagation

Write access is required to both parts to remove a planning split using **Flatten Assembly** or **Manage Intersections**. The resulting new part is assigned to the same permission group as the original parts if they belonged to the same permission group. The new part is assigned to the **Active Permission Group** if the original parts were in different permission groups.

Global Workshare Behavior

Global Workshare allows managed replication of the model at several sites. One of the restrictions of a Workshare configuration is that you only have Read access to objects that are controlled by non-local permission groups.

A system is a logical grouping of sub-systems. When you add or remove a sub-system, you are modifying the definition of the parent system. Therefore, you must have write access to the parent system. You do not need write access to the grandparent system.

When participating in a Global Workshare Configuration, you must manage all permission groups at the host site. The sub-system requirement to have write access to its parent system is not possible if the sub-system's permission group is created at the satellite site and the parent system's permission group is created at the host site.

For example, your host site is Houston and your satellite site is London. You create a system named "Midbody", and its controlling permission group is in Houston. You assign John, who works in London, write access. During the workshare replication process, the Midbody system and permission group is replicated in London. In London, John can add systems, plates, profiles and whatever else he wants to the Midbody system because John was given write access to the system's permission group in Houston. John cannot delete or change any of the properties of the Midbody system in London because the host site, Houston, owns it. He can only add objects to the system. If John were to travel to Houston and log on there, he could delete or change any of the properties of the Midbody system because the Houston host site owns it.

Split Notification

When a seam is added, deleted, or modified, the plate or profile systems and parts split by the seam are affected. The software notifies different tasks to transfer attributes and objects to the new systems and parts. The Molded Forms, Structural Detailing, Planning, Hole Management, and Structural Manufacturing tasks are affected by split notification.

The software uses split notification when:

- A design or planning seam is added and **Execute Split** is run in the Molded Forms task.
- A design or planning seam that has already been split is deleted or modified in the Molded Forms task.
- An intersection seam is added and split when **Execute Split** is run in the Molded Forms task.
- A profile or plate system creating an intersection seam is deleted or modified in the Molded Forms task.
- A planning seam is added when **Manage Block Intersections** is run and an intersecting part is set to **Split** or **Offset** in the Planning task.
- A planning seam is deleted when **Manage Block Intersections** is run and an intersecting part is set to **Intersected** or **Assigned** in the Planning task.
- A planning seam is modified when the cutting plane of a block is modified in the Planning task.

Identifying Seams in Workspace Explorer

You can identify the type of seam in the **Workspace Explorer** by the icon.

- Design seams
- Planning seams
- Straking seams
- Intersection seams

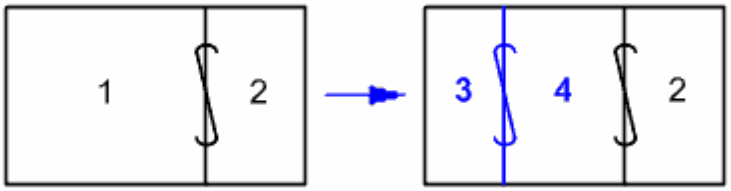
What do you want to do?

- *Add a seam* (on page 24)
- *Delete a seam* (on page 25)
- *Modify a seam when leaf systems are not added or removed* (on page 26)

Add a seam

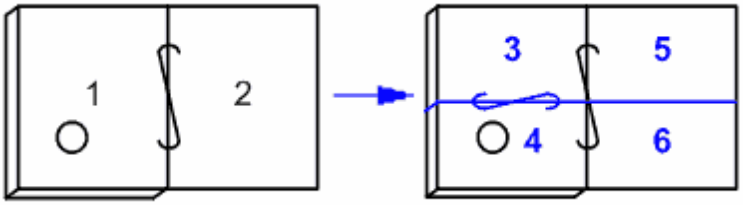
If you split a leaf system and its part with a new seam, the software creates new leaf systems and parts for each split, and deletes the original leaf system.

Molded Forms properties and material information are transferred to the new systems. The default naming rule is used to name the new leaf systems. Logical connections that cross the split are replaced by two new connections with the same properties.

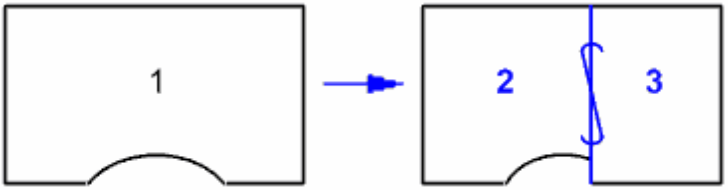


If the part is detailed, Structural Detailing properties and features are transferred to the new parts. The software creates new assembly and physical connections using properties from the previous connections.

⚠ **CAUTION** Straking seams, the leaf parts created by straking seams, and free edge treatments are not transferred and are deleted.

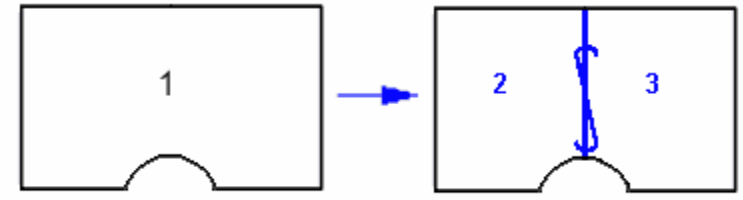


If a seam intersects an existing Structural Detailing feature, the feature is transferred to one of the parts.



Hole cuts and structural hole fittings in the Hole Management task are placed on the **To Do List**. Hole traces and outfitting catalog hole fittings are transferred to the new parts.

If a split passes through an edge feature definition point, the software creates two edge features. If the split does not pass through the definition point, then only the part containing the definition point contains an edge feature.



Block and assembly assignments in the Planning task are transferred. New parts are in the same assembly or block as the original part.

Manufacturing parts are updated using the **Manufacturing Service Manager**.

Connections to ladders, stairs, handrails, members, hangers, and equipment are transferred to the new part.

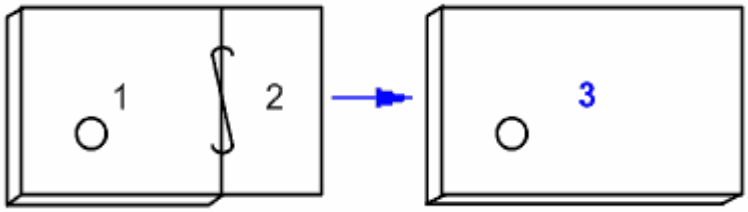
Delete a seam

If you delete or rebound a seam, the software deletes leaf systems and parts and creates new leaf system and parts.

Molded Forms properties and material information are transferred from the first system (as defined by the software) to the new system. The default naming rule is used to name the new leaf system. Logical connections that crossed the split are replaced by a new connection with the same properties as the first system.

Structural Detailing properties and features are transferred to the new part. If one part is detailed and the other is not, the new part is detailed.

⚠ CAUTION Straking seams, the leaf parts created by straking seams, and free edge treatments are not transferred and are deleted.



Hole cuts and structural hole fittings in the Hole Management task are placed on the **To Do List.** Hole traces and outfitting catalog hole fittings are transferred to the new parts.

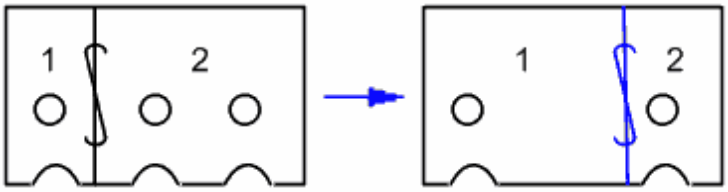
Block and assembly assignments in the Planning task are transferred. If the original parts were in the same assembly or block, then the new part is placed in that assembly or block. If the original parts were in different assemblies, then the new part is placed in the assembly last used by split notification.

Manufacturing parts are updated using the **Manufacturing Service Manager**.

Connections to ladders, stairs, handrails, members, hangers, and equipment are transferred to the new part.

Modify a seam when leaf systems are not added or removed

If you move a seam and the existing systems and parts are modified instead of replaced, then the software does not use split notification. **Structural Detailing** features are not transferred from one part to another, and are placed on the **To Do List**. If a feature is on one part and a seam is later modified so that it crosses the feature, the feature is still on one part. Split notification is not used when a seam is modified.



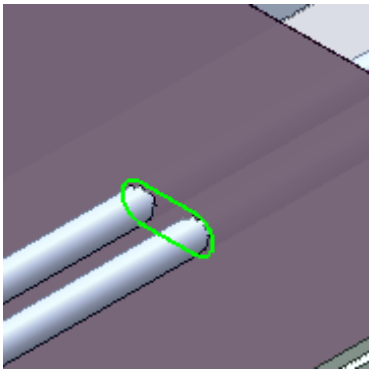
NOTES

- Split notification works with design seams from Molded Forms as well as with planning seams.
- If there are multiple features on one sketch, the software creates two sketches after the split; one for each part. Constraints associated with a sketched feature only go with one sketch after the split. You must manually add the constraints to the other sketch.

SECTION 3

Single Hole

 Creates a single hole trace on a structural part that is associated with one or more outfitting parts such as pipe, HVAC duct, cable tray, or equipment. A single hole trace is created around all of the selected parts.



Hole traces are associated with the outfitting part and the structural part. Because of this association, if either the outfitting parts or the structure is modified, the software automatically updates the hole trace.

When you place a single hole trace, you can define opening properties to better reflect the more granular details of the purpose of the opening or hole, when it is cut, and how it is produced. These properties are grouped into the following categories:

Design Properties

Represent the functional purpose of the opening or hole. The design property reflects why the opening exists in the model. Typical design properties include:

- Access (Permanent)
- Access (Temporary)
- Lightening (Weight Reduction)
- Air Escape
- Liquid Escape
- Air/Liquid Escape
- Foothold
- Martyr

Planning Properties

Represent the staging of the opening or hole. The planning property denotes the point in the design and production lifecycle when the cut is physically made. Typical planning properties include:

- Design
- Shop (Assembly)
- Ship (Field)

Production Properties

Represent the production method of the opening or hole. The planning property denotes whether the cut is truly cut from the system or part, whether it is marked, bridged, and so forth. Typical production properties include:

- Cut (Default)
- Mark
- Bridge
- Chill Hole (Patch)

NOTES

- When you create or edit a single hole, the dialog box title displays the plate system name using the format **Plate System:** *<name of the plate system>*.

- When you create or edit a single hole on a plate part, the dialog box title displays the plate part name using the format **Plate Part:** *<name of the plate part>*.

Single Hole Ribbon

Displays the options that you use to create a single hole trace in the model.

Single Hole Properties

Activates the **Single Hole Properties** dialog box, which you use to view and modify the properties of the hole trace that you are about to place in the model. For more information, see *Hole Trace Properties Dialog Box* (on page 37).

Select Structure

Select the structure in which to place the hole.

Select Outfitting Part

Select one or more pipe, HVAC duct, cable tray, equipment, or other outfitting objects that penetrate the selected structure object in which you want to place a hole trace.

Sketch

Select this option to sketch the hole trace in the Draft 2D environment. For more information, see **Sketch Options** below.

Finish

Places the hole trace in the model.

Reject

Clears the selected object.

Accept

Accepts the selected object.

Hole name

Specifies the name for the hole trace.

Parent system

Select the parent system for the hole trace.

Hole Clearance Rule

Specify the rule that controls the clearance around the outfitting part in the hole trace. For more information about clearance rules, see **Best Fit Clearance Rules** in the *Hole Management Reference Data Guide*.

Opening design type

Specifies the design opening property for the opening or hole. The default value is **Permanent Access**. The list is defined by the CutoutDesignType codelist.

Opening planning method

Specifies the planning opening property for the opening or hole. The default value is **Design**. The list is defined by the CutoutPlanningMethod codelist.

Opening production method

Specifies the production opening property for the opening or hole. The default value is **Cut**. The list is defined by the CutoutProductionMethod codelist.

NOTE For more information about single hole trace opening properties, see *Single Hole* (on page 27).

Sketch Options

Sketching Plane

Specify the sketching plane for the hole trace. This is the first step in defining the hole trace.

Add Intersecting Item

Select objects in the model that intersect the sketching plane that you want to use as reference geometry. These extra objects appear in the Draft 2D environment.

Add Projection Item

Select objects in the model that do not intersect the sketching plane that you want to use as reference geometry. These extra objects are projected onto the sketching plane and appear in the Draft 2D environment.

Sketch 2D

Activates the Draft 2D view in which you can draw the hole trace.

Auto Import Enable/Disable

Allows the software to automatically add all objects that are relative to the object to be sketched to a select set. Items in the select set are highlighted in the graphics view and in the **Workspace Explorer**. If no objects are added to the select set, the software displays a message in the status bar. This option is only available when you use the **Add Intersecting Item** or the **Add Project Item** option.

Coincident Plane

Specifies that you want to sketch the hole on the plane that you select. For more information, see *Define a coincident plane* (on page 12).

Offset from Plane

Specifies a sketching plane for the hole that is offset from a plane that you select. If you choose this option, you must define the offset distance. For more information, see *Define an offset plane* (on page 13).

Angle from Plane

Specifies a sketching plane for the hole that is at a specified angle from a plane that you select. If you choose this option, you must define an axis of rotation and the angle or slope. For more information, see *Define plane using angle from plane* (on page 14).

Plane by Point and Vector

Specifies the sketching plane for the hole using two points to define a vector normal to the sketching plane and a third point to define the sketching plane position along the vector. For more information, see *Define a plane using a point and a normal vector* (on page 14).

Plane by Three Points

Specifies the sketching plane for the hole using three points that you specify in the model. For more information, see *Define a plane using three points* (on page 16).

Plane by Vectors Normal

Defines a plane normal to a selected plane, and coincident with a vector between two selected points. For more information, see *Define plane by vectors normal* (on page 16).

Offset

Specify the offset distance for the sketching plane from the selected plane. You can specify the offset dynamically in graphics or by typing the distance. The **Offset** option is available only when you use the **Offset from Plane** option.

Angle

Specify the angle at which to place the sketching plane relative to the selected plane. You must define the axis of rotation using two points before you can define the angle. The **Angle** option is available only when you use the **Angle from Plane** option.

Step

Specifies the offset or angle step.

Select Vector Normal to Plane

Select the vector normal to the sketching plane. This option is available only when you use the **Plane by Point & Vector** option.

Define Point

Specify the point along the vector at which to place the sketching plane. This option is available only when you use the **Plane by Point & Vector** option.

Define Point 1

Specify the location of the first of three points that defines the sketching plane. This option is available only when you are using the **Plane By Three Points** option.

Define Point 2

Specify the location of the second of three points that defines the sketching plane. This option is available only when you are using the **Plane By Three Points** option.

Define Point 3

Specify the location of the third of three points that defines the sketching plane. This option is available only when you are using the **Plane By Three Points** option.

Select Plane

Select the plane to which your sketching plane is to be normal. This option is available only when you are using the **Plane By Vectors Normal** option.

Select First Point

Specify the location of the first vector point. Your sketching plane is parallel to this vector. This option is available only when you are using the **Plane By Vectors Normal** option.

Select Second Point

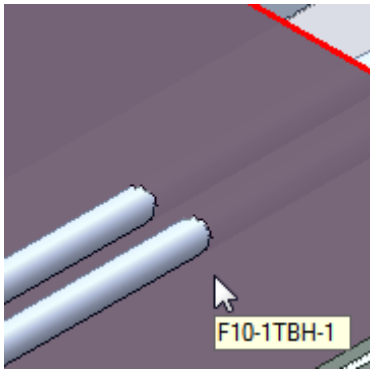
Specify the location of the second vector point. Your sketching plane is parallel to this vector. This option is available only when you are using the **Plane By Vectors Normal** option.

What do you want to do?

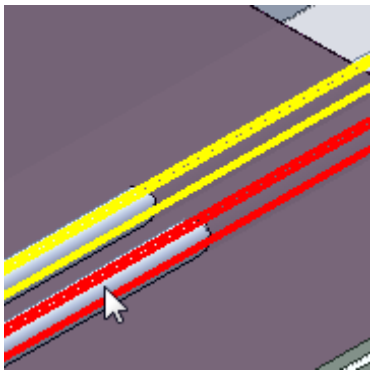
- *Place single hole trace* (on page 31)
- *Place single hole trace by sketching* (on page 33)
- *Modify a hole trace* (on page 36)
- *Copy and paste a hole trace* (on page 36)
- *Delete a hole trace* (on page 37)

Place single hole trace

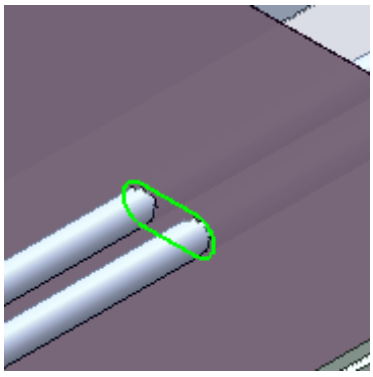
1. Click **Single Hole** .
2. Select the structure on which the hole trace is needed.



3. Select one or more equipment or outfitting parts (such as pipe, HVAC duct, or cableway) that penetrate the selected structure.



4. Click **Accept** .

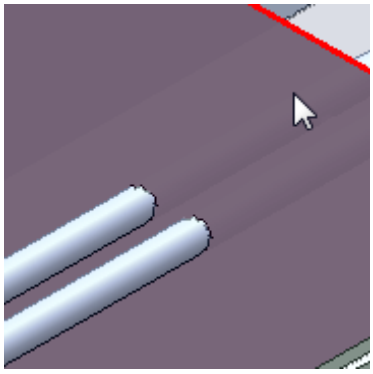


5. Select a name for the hole trace in the **Hole name** box.
6. Select a parent system for the hole trace in the **Parent system** box.
7. Click **Finish**.

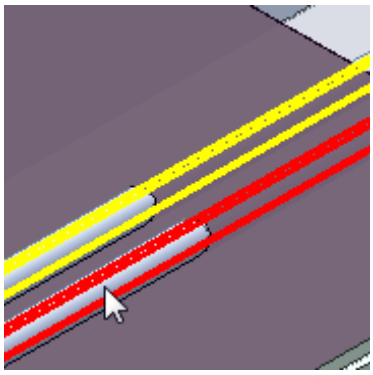
NOTE You can click **Hole Trace Properties**  on the ribbon to modify the hole trace properties. For more information, see *Hole Trace Properties Dialog Box* (on page 37).

Place single hole trace by sketching

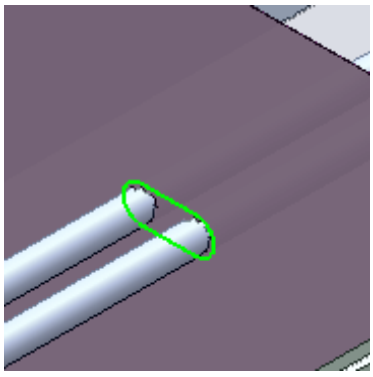
1. Click **Single Hole**  .
2. Select the structure on which the hole trace is needed.



3. Optionally, select one or more equipment or outfitting parts (such as pipe, HVAC duct, or cableway) that penetrate the selected structure.

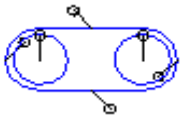


4. Click **Accept**  .



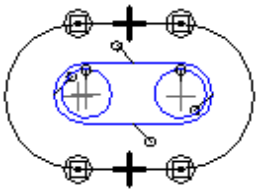
5. Click **Sketch** .
6. If a sketching plane other than the plane of the structural part is needed, specify the plane using one of the following methods:

   Define a coincident plane (on page 12)
   Define an offset plane (on page 13)
   Define plane using angle from plane (on page 14)
   Define a plane using a point and a normal vector (on page 14)
   Define a plane using three points (on page 16)
   Define plane by vectors normal (on page 16)
7. Click **Add Intersecting Item** .
8. Select objects in the model that intersect the sketching plane that you want to use as reference geometry. These extra objects appear in the Draft 2D environment.
9. Click **Add Projection Item** .
10. Select objects in the model that do not intersect the sketching plane that you want to use as reference geometry. These extra objects are projected onto the sketching plane and appear in the Draft 2D environment.
11. Click **Sketch 2D** .

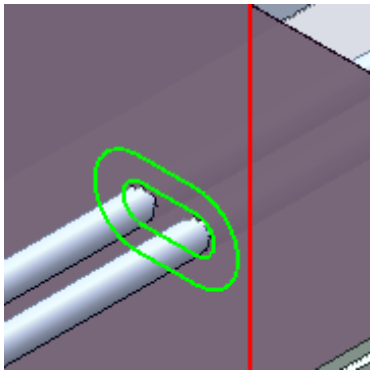


12. Using the available drawing commands in the Draft 2D environment, draw the hole trace.

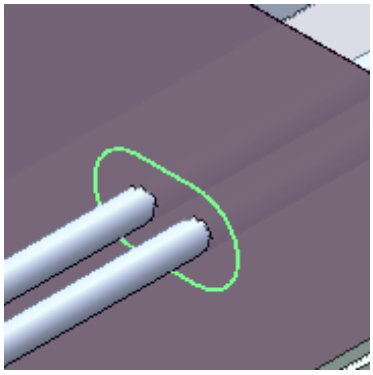
    NOTE An outline of the automatically generated hole trace appears as reference geometry in the Draft 2D environment. You can ignore this geometry.



13. Click **Finish** on the ribbon in the Draft 2D environment.



14. Select a name for the hole trace in the **Hole name** box.
15. Select a parent system for the hole trace in the **Parent system** box.
16. Select a hole clearance rule for the hole trace in the **Hole Clearance Rule** box.
17. Use the **Opening design type**, **Opening planning method**, and **Opening production method** lists to set the design, planning, and production properties on the single hole trace.
18. Click **Finish**.



NOTE You can click **Hole Trace Properties** on the ribbon to modify the hole trace properties. For more information, see *Hole Trace Properties Dialog Box* (on page 37).

Modify a hole trace

1. Click **Select**.
2. Select **Holes** in the **Locate Filter**.
3. Select the hole trace to modify.
4. Using the ribbon controls, modify the hole trace as needed.

Copy and paste a hole trace

1. Select **Holes** from the **Select Filter** list.
2. Select the hole trace to copy. You can select it from the model or the **Workspace Explorer**.
3. Click **Edit > Copy**.

   TIP If you select the object from the **Workspace Explorer**, you can right-click and select **Copy** from the menu.
4. Select the penetration to which to copy the hole trace. You can select it from the model or the **Workspace Explorer**. The destination penetration does not need to be the same size or shape as the source.
5. Click **Edit > Paste**.

   TIP If you select the object from the **Workspace Explorer**, you can right-click and select **Paste** from the menu.

   The software copies the hole trace from the source to the destination.

Delete a hole trace

1. Click **Select** .
2. Select **Holes** in the **Locate Filter**.
3. Select the hole trace to delete.
4. Click **Delete** .

NOTE The hole cut and the hole fitting associated with the hole trace are also deleted.

Hole Trace Properties Dialog Box

Specifies the properties for the single hole trace that you are placing or editing.

Hole Tab (Hole Trace Properties Dialog Box)

Specifies the general properties of the hole trace.

System

Select the parent system for the hole trace.

Name

Displays the name of the hole trace. You can define the name yourself by setting the **Naming Rule** box to **User Defined**.

Naming rule

Select the naming rule to use to name the hole trace. Select **User Defined** to define the name yourself in the **Name** box. For more information about naming rules, see **Hole Naming Rules** in the *Hole Management Reference Data Guide.*

Hole size

Displays the size of the hole trace. This information is read-only.

Application

Displays the task associated with the hole trace. For example, if the hole trace is the result of a pipe penetrating a structure, then Piping appears. Similarly, if the hole trace is the result of a HVAC duct, then HVAC appears.

Outfitting Part Name

Displays the name of the outfitting part.

Hole Clearance Rule

Specify the rule that controls the clearance around the outfitting part in the hole trace. For more information about clearance rules, see **Best Fit Clearance Rules** in the *Hole Management Reference Data Guide*.

User Answers

Select answers to questions asked by smart occurrence hole rules, and then select from a list of hole trace options that match all of the answers. The default answers are determined by the rules. For more information, see **Smart Occurrence Hole Rules** in the *Hole Management Reference Data Guide*.

Valid

Click this option after making any changes to the user answers so that valid results for the answers are displayed in the associated field.

Opening design type

Specifies the design opening property for the opening or hole. The default value is **Permanent Access**. The list is defined by the CutoutDesignType codelist.

Opening planning method

Specifies the planning opening property for the opening or hole. The default value is **Design**. The list is defined by the CutoutPlanningMethod codelist.

Opening production method

Specifies the production opening property for the opening or hole. The default value is **Cut**. The list is defined by the CutoutProductionMethod codelist.

NOTE For more information about opening properties, see *Single Hole* (on page 27).

Board Management

Symmetry

Displays the symmetry value for the hole. The Board Management Service determines the symmetry value. For more information about the Board Management Service, see the *Structural Detailing User's Guide*, available from the **Help > Printable Guides** command.

Symmetrical Part

Displays the name of the symmetrical hole, if available. The Board Management Service determines the symmetrical part.

See Also

Hole Trace Properties Dialog Box (on page 37)

Structure Tab (Hole Trace Properties Dialog Box)

Displays information about the structure in which the hole trace is placed.

System name

Displays the name of the parent plate or profile system.

Part name

Displays the plate or profile part name.

Manufacturer part name

Displays the manufacturer part name of the structure.

Material

Displays the material of which the structure was made.

Grade

Displays the grade of the structure material.

Thickness

Displays the thickness of the structure.

Tightness

Displays the tightness defined for the structure.

Creator

Displays the user name of the person who created the structure.

Description

Displays any additional information describing the structure.

For more information about plate and profile properties, see the *Molded Forms User's Guide*, available from the **Help > Printable Guides** command.

See Also

Hole Trace Properties Dialog Box (on page 37)

General Tab (Hole Trace Properties Dialog Box)

The **General** tab displays the properties that were selected by you or automatically determined by the software at creation. The property name appears on the left side of the grid and the corresponding property value appears on the right side of the grid.

The properties displayed duplicate those available on other tabs, such as the **Main** tab. You should edit the properties on these tabs.

Configuration Tab

Displays the creation, modification, and status information about an object.

NOTE You cannot define the filters using the **Configuration** tab.

Plant

Displays the name of the model. You cannot change this value.

Permission Group

Specifies the permission group to which the object belongs. You can select another permission group, if needed. Permission groups are created in Project Management.

Transfer

Reassigns ownership of the selected model objects from their current permission group to another satellite or host permission group. This option is only available if the active model or project is replicated in a workshare configuration. The option is not available if all of the objects in the select set already belong to another location and are non-transferable. For more information, see *Transfer Ownership Dialog Box* in the *Common User's Guide*.

NOTE The **Transfer** option does not apply to the filters and surface style rules.

Approval State

Specifies the current status of the selected object or filter. The display depends on your access level. You might be unable to change the status of the object. The list is defined by the ApprovalStatus codelist.

NOTE You can only edit or manipulate an object with a status of **Working**.

Status

Specifies the location of the object in the workflow process. Changing this property sets the **Approval State**. The list is controlled by the ApprovalReason codelist in the ApprovalReason.xls file. You must bulkload this file. For more information, see *ApprovalReason* in the *Reference Data Guide*.

Date Created

Specifies the creation date of the object.

Created by

Specifies the name of the person who created the object.

Date Last Modified

Specifies the date when the object was last modified.

Last Modified by

Specifies the name of the person who last modified the object.

Transfer Ownership Dialog Box

Allows you to specify a new location and permission group for the selected model objects.

Current location

Displays the name of the location with which the current permission group is associated. All of the objects in the select set must belong to the same location.

Current permission group

Displays the name of the permission group with which the selected objects are currently associated. If all of the objects in the select set do not belong to the same permission group, this box appears blank.

New location

Specifies the name of the location to which you want to assign the objects. In a global workshare configuration, this box lists all the locations in which you have write access to one or more permission groups. The selection in this box filters the entries in the **New permission group** box.

New permission group

Specifies the new permission group to which to assign the selected objects. If you specify a value in the **New location** box, this list displays all permission groups to which you have write access in the selected location. If you do not specify a value in the **New location** box, this list includes all permission groups to which you have write access in all locations except the current location. This box is blank if you do not have write access to any permission groups at any locations other than the current one.

NOTE We strongly recommend that administrators follow naming convention rules that include the location as a prefix in the permission group name.

Notes Tab

Creates and edits user-definable text placed by the designer on an object in the model. The notes provide special instructions related to the object for the fabricator and are available in downstream tasks. For example, the notes appear in two-dimensional drawings and within design review sessions.

NOTE Only one note of a given kind from a given object can be shown on a drawing. For example, if there are two fabrication notes on a piping part, then only one of the notes shows on the drawing. It is important to know about and to consider this situation when defining notes on an object in the modeling phase. For example, you can display one Fabrication note and one Installation note by defining two separate labels for the two kinds of notes.

Key point

Specifies the key point on the object to which you want to add a note.

Notes at this location, listed by name

Lists all notes for the selected key point on the object.

Date

Displays the date that the note was created. The system automatically supplies the date.

Time

Displays the time that the note was created. The system automatically supplies the time.

Purpose of note

Specifies the purpose of the note.

Author

Displays the login name of the person who created the note. The system automatically supplies this information. You cannot change this information.

Note text

Defines the note text. The software does not limit the length of the note text.

Show dimension

Indicates that the note generates a dimension.

If you are displaying the properties for a Support component, then a dimension can be included for the component in the Support drawings, if you select the **Show dimension** option. The note must be associated with one of the key points for the Support component. It is recommended that you set the **Purpose of note** as **Fabrication**, but this is not a requirement. The note **Name** and **Note text** are not used when you select this option.

New Note

Creates a new note on the object.

Standard Note

Displays a list of standard notes from which you can select. This feature is not available in this version.

Highlight Note

Highlights the note in the graphic view so that you can easily find the note and the object to which it is related. This feature is not available in this version.

Delete Note

Deletes the currently displayed note.

Relationship Tab

Displays all objects related to the selected object for which you are viewing properties. For example, if you are viewing the properties of a pipe run, the related pipeline, features, parts, associated control points, hangers or supports, and equipment display on this tab. All WBS assignments, including project relationships, appear on this tab.

Additional examples for marine relationships are as follows:

- For plate and profile system properties, the related bounded objects, bounding objects, and connections are shown.
- For plate and profile system part properties, parent systems are shown.
- For assembly connection properties, all connected objects are shown.
- For the properties of a frame connection on a member, supported, supporting, and auxiliary supporting parts are shown.
- For split connection properties, the parent and auxiliary supporting parts are shown.

Name

Specifies the name of the object.

Type

Specifies the type of object. To change the options on the list, edit the **Weld Type** select list in Catalog.

Go To

Displays the properties of the selected object.

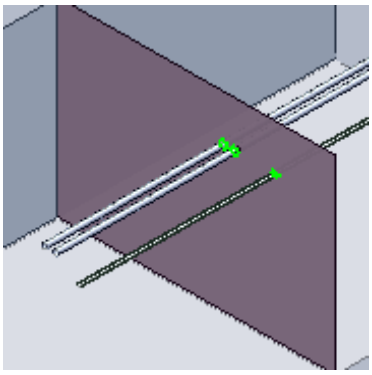
SECTION 4

Multiple Holes

 Creates multiple hole traces in a single process. You can select the one or more outfitting parts, structural parts, or both to process.

If you select an outfitting part, the software automatically finds all structural parts that the selected outfitting part penetrates and generates separate hole traces at each intersection point.

If you select a structural part, the software automatically finds all the outfitting parts that penetrate the selected structure and generates separate hole traces at each intersection point.



When you place multiple hole traces, you can define opening properties to better reflect the more granular details of the purpose of the opening or hole, when it is cut, and how it is produced. These properties are grouped into the following categories:

Design Properties

Represent the functional purpose of the opening or hole. The design property reflects why the opening exists in the model. Typical design properties include:

- Access (Permanent)
- Access (Temporary)
- Lightening (Weight Reduction)
- Air Escape
- Liquid Escape
- Air/Liquid Escape
- Foothold
- Martyr

Planning Properties

Represent the staging of the opening or hole. The planning property denotes the point in the design and production lifecycle when the cut is physically made. Typical planning properties include:

- Design
- Shop (Assembly)
- Ship (Field)

Production Properties

Represent the production method of the opening or hole. The planning property denotes whether the cut is truly cut from the system or part, whether it is marked, bridged, and so forth. Typical production properties include:

- Cut (Default)
- Mark
- Bridge
- Chill Hole (Patch)

Multiple Holes Ribbon

Displays the options that you use to place multiple holes in the model.

Multiple Hole Properties

Activates the **Multiple Holes Properties** dialog box, which you use to view and modify the properties of the hole traces that you are about to place. For more information, see *Multiple Hole Properties Dialog Box* (on page 50).

Select Structure or Outfitting Part

Select the pipe, HVAC duct, cableway, equipment, or structure to place hole traces for.

Finish

Places the hole traces in the model.

Cancel Selection

Clears the selected object.

Confirm Selection

Accepts the selected object.

Parent system

Select the parent system for the hole traces.

Opening design type

Specifies the design opening property for the opening or hole. The default value is **Permanent Access**. The list is defined by the CutoutDesignType codelist.

Opening planning method

Specifies the planning opening property for the opening or hole. The default value is **Design**. The list is defined by the CutoutPlanningMethod codelist.

Opening production method

Specifies the production opening property for the opening or hole. The default value is **Cut**. The list is defined by the CutoutProductionMethod codelist.

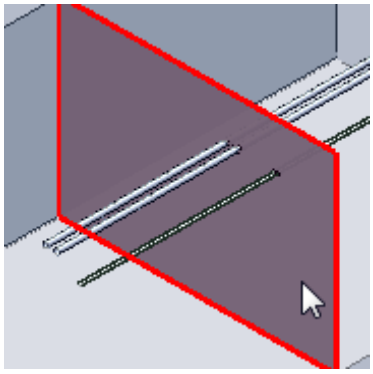
NOTE For more information about multiple hole trace opening properties, see *Multiple Holes* (on page 45).

What do you want to do?

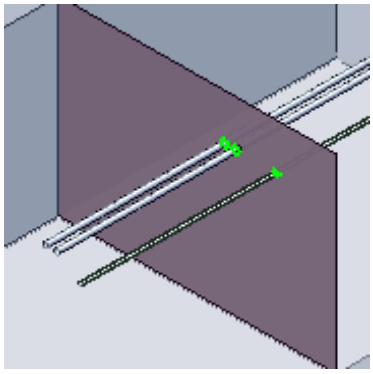
- *Place multiple hole traces in structure* (on page 48)
- *Place multiple hole traces for outfitting parts* (on page 49)

Place multiple hole traces in structure

1. Click **Multiple Holes** .
2. Select one or more structural systems in which the hole traces are needed.



3. Click **Accept** .

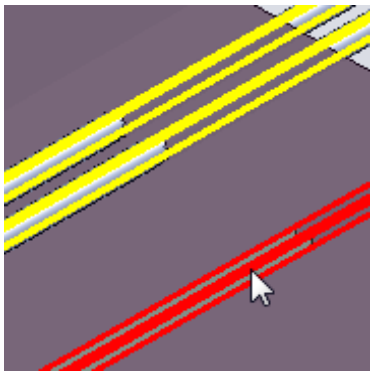


4. Select a parent system for the hole trace in the **Parent system** box.
5. Use the **Opening design type**, **Opening planning method**, and **Opening production method** lists to set the design, planning, and production properties on the multiple hole traces.
6. Click **Finish**.

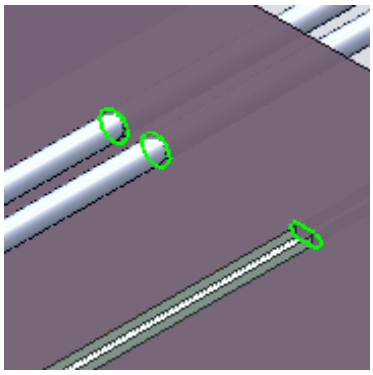
NOTE You can click **Multiple Hole Properties Dialog Box** on the ribbon to modify the hole trace properties. For more information, see *Multiple Hole Properties Dialog Box* (on page 50).

Place multiple hole traces for outfitting parts

1. Click **Multiple Holes** .
2. Select one or more outfitting parts (such as pipe, cableway, or HVAC duct) for which hole traces are needed.



3. Click **Accept** .



4. Select a parent system for the hole trace in the **Parent system** box.
5. Click **Finish**.

Multiple Hole Properties Dialog Box

Specifies the properties for the hole traces you are placing.

NOTE This dialog box is only available when you create hole traces using the **Multiple Holes** command. When you modify the hole traces, the Hole Trace Properties Dialog Box is available. For more information, see *Hole Trace Properties Dialog Box* (on page 37).

See Also

Hole Tab (Multiple Hole Properties Dialog Box) (on page 51)

Hole Tab (Multiple Hole Properties Dialog Box)

Specifies the general properties for placement of the multiple hole traces.

Parent system

Select the parent system for the hole traces.

Hole naming rule

Select the naming rule to use to name the hole traces. Select **User Defined** to define the name yourself in the **Name** box. For more information about naming rules, see **Hole Naming Rules** in the *Hole Management Reference Data Guide.*

Hole Clearance Rule

Specify the rule that controls the clearances around the outfitting parts in the hole traces. For more information about clearance rules, see **Best Fit Clearance Rules** in the *Hole Management Reference Data Guide*.

Opening design type

Specifies the design opening property for the opening or hole. The default value is **Permanent Access**. The list is defined by the CutoutDesignType codelist.

Opening planning method

Specifies the planning opening property for the opening or hole. The default value is **Design**. The list is defined by the CutoutPlanningMethod codelist.

Opening production method

Specifies the production opening property for the opening or hole. The default value is **Cut**. The list is defined by the CutoutProductionMethod codelist.

NOTE For more information about cutout properties, see *Multiple Holes* (on page 45).

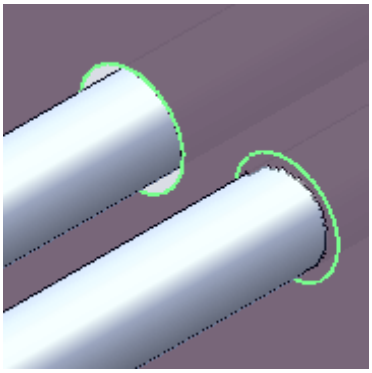
See Also

Multiple Hole Properties Dialog Box (on page 50)

SECTION 5

Cut Hole

Cuts holes in structural parts for one or more selected hole traces. The structural parts first must be detailed in the Structural Detailing task. For members, walls and slabs, the parts do not need to be detailed.



Hole cuts are associated with the hole trace and the structural part. Because of this association, if either the hole trace or the structural part is modified, the software updates the hole cut. Hole cut geometry is associated with the hole trace geometry. The hole cut object is a child of the structural part in the **Workspace Explorer**.

Cut Hole Ribbon

Displays the options that you use to create a hole cut in the model.

Hole Cut Properties

Activates the **Hole Cut Properties** dialog box, which you use to view and modify the properties of the hole cut that you are about to place in the model. For more information, see *Hole Cut Properties Dialog Box* (on page 56).

Select Hole Traces

Select one or more hole traces used to define the hole cut.

Finish

Places hole cuts on the detailed structural parts.

Reject

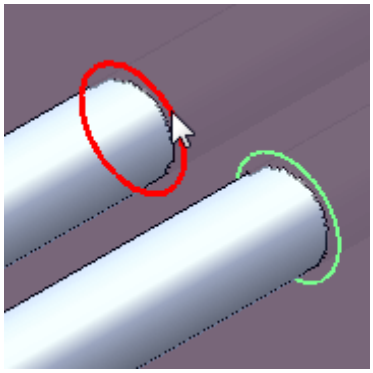
Clears the selected hole trace.

What do you want to do?

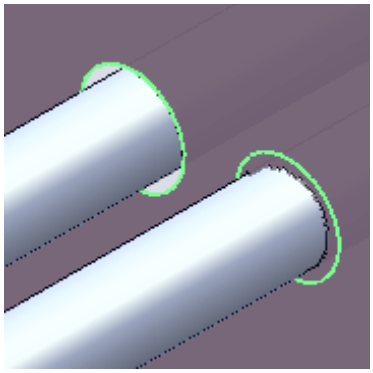
- *Place a hole cut* (on page 53)
- *Modify a hole cut* (on page 55)
- *Copy and paste a hole cut* (on page 55)
- *Delete a hole cut* (on page 55)

Place a hole cut

1. Click **Cut Hole** .
2. Select one or more hole traces to cut.



3. Click **Finish**.



NOTES

- You must detail the structural parts associated with the hole trace in the **Structural Detailing** task before placing a hole cut.
- You can click **Hole Cut Properties** on the ribbon to modify the hole cut properties. For more information, see *Hole Cut Properties Dialog Box* (on page 56).

Modify a hole cut

1. Click **Select** .
2. Select **Hole Features** in the **Locate Filter**.
3. Select the hole cut to modify.
4. Using the ribbon controls, modify the hole cut as needed.

Copy and paste a hole cut

1. Select **Hole Features** from the **Select Filter** list.
2. Select the hole cut to copy. You can select it from the model or the **Workspace Explorer**.
3. Click **Edit > Copy**.

   TIP If you select the object from the **Workspace Explorer**, you can right-click and select **Copy** from the menu.
4. Click **Edit > Paste**.

   TIP If you select the object from the **Workspace Explorer**, you can right-click and select **Paste** from the menu.

   *The **Paste** dialog box displays.*
5. Select the hole trace to which to paste the hole cut. You can select it from the model or the **Workspace Explorer**.

   *The software fills in the information in on the **Paste** dialog box.*
6. Click **OK**.

   The software copies the hole cut from the source to the destination.

NOTE You can copy multiple hole cuts.

Delete a hole cut

1. Click **Select** .
2. Select **Hole Features** in the **Locate Filter**.
3. Select the hole cut to delete.
4. Click **Delete** .

NOTES

- A structural hole fitting associated with the hole cut is also deleted.
- An outfitting catalog hole fitting associated with the hole cut is not deleted.

Hole Cut Properties Dialog Box

Specifies the properties for the hole cut that you are placing or editing.

Configuration Tab (on page 41)
Notes Tab (on page 42)
Relationship Tab (on page 44)

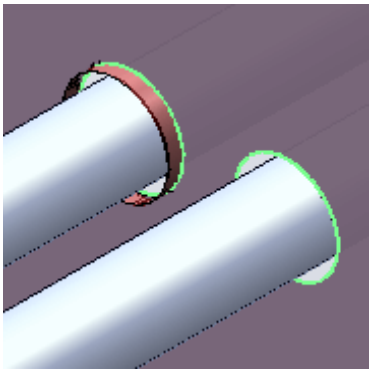
SECTION 6

Hole Fitting

Adds hole fittings to structural parts for a selected hole trace. Two types of hole fittings can be placed:

Structural fittings are typically placed by structural users after detailing structural parts (in the Structural Detailing task) and cutting holes. Structural fittings are calculated based on the size of a hole cut, similar to edge reinforcements in the Molded Forms and Structural Detailing tasks. Structural fittings are the default selection by rules in the software.

Catalog fittings are typically placed by outfitting users after placing hole traces, but before holes are cut in the structural part. Catalog fittings are fixed in size.



Hole fittings are associated with the hole trace and the structural part. Because of this association, if either the hole trace or the structural part is modified, the software updates a structural hole fitting. Catalog fittings must be changed manually.

A structural hole fitting is a child of the structural part in the **Workspace Explorer**. The default parent of an outfitting catalog hole fitting is the hole trace, but you can select another parent.

Hole Fitting Ribbon

Displays the options that you use to create a hole fitting in the model.

Hole Fitting Properties

Activates the **Hole Fitting Properties** dialog box, which you use to view and modify the properties of the fitting that you are about to place in the model. For more information, see *Hole Fitting Properties Dialog Box* (on page 64).

Select Hole Trace

Select a hole trace used to define the hole fitting.

Finish

Places the hole fitting in the model.

Reject

Clears the selected object.

Accept

Accepts the selected object.

Parent

Select the parent system for an outfitting catalog hole fitting. The **Parent** option is available only when you select an outfitting catalog fitting by clearing the **By rule** option and selecting **More** in the **Fitting type** option.

NOTE The structural part is the parent for structural fittings.

Fitting type

Select the hole fitting to place with the hole. If **By Rule** is selected, then this option is disabled.

By rule

Select to allow the software to automatically select the fitting type according to rules in the software. For more information about fitting rules, see **Fitting Selection Rules** in the *Hole Management Reference Data Guide*.

Flip

Moves the fitting to the other side of the structure. The default side for fittings is the side opposite of profile stiffeners as defined for the structure in the Molded Forms task.

Sketch

Select this option to sketch the fitting in the Draft 2D environment. The **Sketch** option is available only when you select a structural fitting that can be sketched, such as **Wall Attached**. For more information, see **Sketch Options** below.

Sketch Options

Sketching Plane

Specifies the sketching plane for the fitting. This is the first step in defining the fitting.

Add Intersecting Item

Select objects in the model that intersect the sketching plane that you want to use as reference geometry. These extra objects appear in the Draft 2D environment.

Add Projection Item

Select objects in the model that do not intersect the sketching plane that you want to use as reference geometry. These extra objects are projected onto the sketching plane and appear in the Draft 2D environment.

Sketch 2D

Activates the Draft 2D view.

Coincident Plane

Specifies that you want to sketch on the plane that you select. For more information, see *Define a coincident plane* (on page 12).

Offset from Plane

Specifies a sketching plane that is offset from a plane that you select. If you choose this option, you must define the offset distance. For more information, see *Define an offset plane* (on page 13).

Angle from Plane

Specifies a sketching plane that is at a specified angle from a plane that you select. If you choose this option, you must define an axis of rotation and the angle or slope. For more information, see *Define plane using angle from plane* (on page 14).

Plane by Point & Vector

Specifies the sketching plane using two points to define a vector normal to the sketching plane and a third point to define the sketching plane position along the vector. For more information, see *Define a plane using a point and a normal vector* (on page 14).

Plane By Three Points

Specifies the sketching plane using three points that you specify in the model. For more information, see *Define a plane using three points* (on page 16).

Plane By Vectors Normal

Defines a plane normal to a selected plane, and coincident with a vector between two selected points. For more information, see *Define plane by vectors normal* (on page 16).

Maintain the relationships on the plane with its definition method

Maintains the relationships of the plane to the definition method and the geometry used by the definition method. For example, a plane created with **Offset from Plane** maintains the relationship of the selected plane and the **Offset** value. Otherwise, this option disables the relationships of the plane to allow moving of the plane.

NOTE When you copy a bracket and use **Edit > Paste > Delete Optional** to remove a boundary, **Maintain the relationships on the plane with its definition method** is not visible. You must first click **Select Bracket Supports** to allow the command to determine the applicable options.

Offset

Specify the offset distance for the sketching plane from the selected plane. You can specify the offset dynamically in graphics or by typing the distance. The **Offset** option is available only when you use the **Offset from Plane** option.

Angle

Specify the angle at which to place the sketching plane relative to the selected plane. You must define the axis of rotation using two points before you can define the angle. The **Angle** option is available only when you use the **Angle from Plane** option.

Step

Specifies the offset or angle step.

Select Vector

Select the vector normal to the sketching plane. This option is available only when you use the **Plane by Point & Vector** option.

Define Point

Specify the point along the vector at which to place the sketching plane. This option is available only when you use the **Plane by Point & Vector** option.

Define Point 1

Specify the location of the first of three points that defines the sketching plane. This option is available only when you are using the **Plane By Three Points** option.

Define Point 2

Specify the location of the second of three points that defines the sketching plane. This option is available only when you are using the **Plane By Three Points** option.

Define Point 3

Specify the location of the third of three points that defines the sketching plane. This option is available only when you are using the **Plane By Three Points** option.

Select Plane

Select the plane to which your sketching plane is to be normal. This option is available only when you are using the **Plane By Vectors Normal** option.

Select First Point

Specify the location of the first vector point. Your sketching plane is parallel to this vector. This option is available only when you are using the **Plane By Vectors Normal** option.

Select Second Point

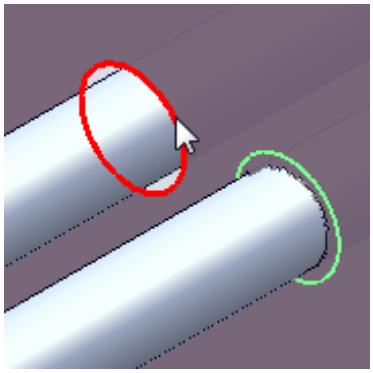
Specify the location of the second vector point. Your sketching plane is parallel to this vector. This option is available only when you are using the **Plane By Vectors Normal** option.

What do you want to do?

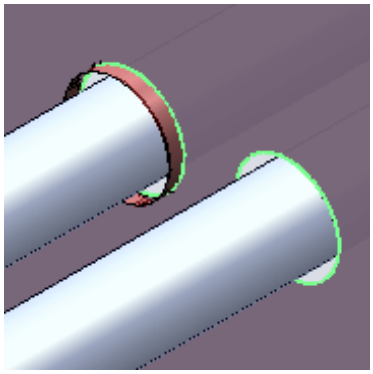
- *Place a hole fitting using rules* (on page 61)
- *Place an outfitting catalog hole fitting* (on page 62)
- *Place a structural hole fitting* (on page 62)
- *Modify a hole fitting* (on page 63)
- *Copy and paste a hole fitting* (on page 63)
- *Delete a hole fitting* (on page 63)

Place a hole fitting using rules

1. Click **Hole Fitting** .
2. Select a hole trace.



3. Click **Accept** .
4. If needed, click **Flip** to move the fitting to the other side of the structure.
5. Click **Finish**.



NOTES

- If the default hole fitting placed by the rules is a structural fitting, you must first cut the hole in a detailed structural part using the **Cut Hole** command.
- You can click **Hole Fitting Properties** on the ribbon to modify the fitting properties. For more information, see *Hole Fitting Properties Dialog Box* (on page 64).

Place an outfitting catalog hole fitting

1. Click **Hole Fitting** .
2. Select a hole trace.
3. Clear the **By rule** box.
4. Select **More** in the **Fitting Type** field.
5. Select a catalog fitting in the **Part Browser**.
6. Click **OK**.
7. If needed, click **Flip** to move the fitting to the other side of the structure.
8. Select a parent system in the **Parent** field.
9. Click **Finish**.

NOTE You can click **Hole Fitting Properties** on the ribbon to modify the fitting properties. For more information, see *Hole Fitting Properties Dialog Box* (on page 64).

Place a structural hole fitting

1. Click **Hole Fitting** .
2. Select a hole trace.
3. Clear the **By rule** box.
4. Select a fitting in the **Fitting Type** field.
5. Select a catalog fitting in the **Part Browser**.
6. Click **OK**.
7. If needed, click **Flip** to move the fitting to the other side of the structure.
8. Click **Finish**.

NOTES

- You must cut the hole in a detailed structural part using the **Cut Hole** command before placing a structural hole fitting.
- The plate part containing the hole cut is the parent of the structural hole fitting.
- You can click **Hole Fitting Properties** on the ribbon to modify the fitting properties. For more information, see *Hole Fitting Properties Dialog Box* (on page 64).

Modify a hole fitting

1. Click **Select** .
2. Select **Hole Features** in the **Locate Filter**.
3. Select the hole fitting to modify.
4. Using the ribbon controls, modify the hole fitting as needed.

Copy and paste a hole fitting

1. Select **Hole Fittings** from the **Select Filter** list.
2. Select the hole fitting to copy. You can select it from the model or the **Workspace Explorer**.
3. Click **Edit > Copy**.

   TIP If you select the object from the **Workspace Explorer**, you can right-click and select **Copy** from the menu.
4. Click **Edit > Paste**.

   TIP If you select the object from the **Workspace Explorer**, you can right-click and select **Paste** from the menu.

   *The **Paste** dialog box displays.*
5. Select the hole trace to which to paste the hole fitting. You can select it from the model or the **Workspace Explorer**.

   *The software fills in the information on the **Paste** dialog box.*
6. Click **OK**.

   The software copies the hole fitting from the source to the destination.

Delete a hole fitting

1. Click **Select** .
2. Select **Hole Features** in the **Locate Filter**.
3. Select the hole fitting to delete.
4. Click **Delete** .

Hole Fitting Properties Dialog Box

Specifies the properties for the hole fitting that you are placing or editing.

Fitting Tab (Hole Fitting Properties Dialog Box) (on page 64)
Configuration Tab (on page 41)
Notes Tab (on page 42)
Relationship Tab (on page 44)

Fitting Tab (Hole Fitting Properties Dialog Box)

Specifies the general properties of an outfitting catalog hole fitting. This tab is only available when you place catalog fittings. Please note that pipe fitting by rule are not catalog fittings.

Fitting Type

Select the hole fitting to place with the hole. If **By Rule** is selected, then this option is disabled.

By rule

Select to allow the software to automatically select the fitting type according to rules in the software. For more information about fitting rules, see **Fitting Selection Rules** in the *Hole Management Reference Data Guide*.

Fitting Selection

Specify the rule used to select the fitting type.

Name

Displays the name of the hole trace. You can define the name yourself by setting the **Rule** box to **User Defined**.

Rule

Select the naming rule to use to name the hole fitting. Select **User Defined** to define the name yourself in the **Name** box. Outfitting catalog hole fittings use the general outfitting naming rules. For more information about outfitting naming rules, see **Naming Rules Reference Data** in the *Hole Management Reference Data Guide.*

Category

Select the class of catalog fitting properties you want to view. For more information about catalog fittings, see **Fitting Worksheets** in the *Hole Management Reference Data Guide*

Property

Name of the catalog fitting property.

Values

Value of the catalog fitting property.

See Also

Hole Fitting Properties Dialog Box (on page 64)

SECTION 7

Hole Cut and Fitting

 Cuts a hole in the structural part and places a fitting around the hole cut for a selected hole trace. The structural part must first be detailed in the Structural Detailing task.

Hole cuts are associated with the hole trace and the structural part. Because of this association, if either the hole trace or the structural part is modified, the software updates the hole cut. Hole cut geometry is associated with the hole trace geometry. The hole cut object is a child of the structural part in the **Workspace Explorer**.

Two types of hole fittings can be placed:

- **Structural** fittings are calculated based on the size of a hole cut, similar to edge reinforcements in the Molded Forms and Structural Detailing tasks. Structural fittings are the default selection by rules in the software.
- **Catalog** fittings are fixed in size.

Hole fittings are associated with the hole trace and the structural part. Because of this association, if either the hole trace or the structural part is modified, the software updates a structural hole fitting. Catalog fittings must be changed manually.

A structural hole fitting is a child of the structural part in the **Workspace Explorer**. The default parent of an outfitting catalog hole fitting is the hole trace, but you can select another parent.

Hole Cut and Fitting Ribbon

Displays the options that you use to create a hole cut and hole fitting in the model.

 **Select Hole Trace**

Select a hole trace used to define the hole fitting.

Finish

Places the hole fitting in the model.

 **Reject**

Clears the selected object.

 **Accept**

Accepts the selected object.

Parent

Select the parent system for an outfitting catalog hole fitting. The **Parent** option is available only when you select an outfitting catalog fitting by clearing the **By rule** option and selecting **More** in the **Fitting type** option.

NOTE The structural part is the parent for a hole cut and a structural fitting.

Fitting type

Select the hole fitting to place with the hole. If **By Rule** is selected, then this option is disabled.

By rule

Select to allow the software to automatically select the fitting type according to rules in the software. For more information about fitting rules, see **Fitting Selection Rules** in the *Hole Management Reference Data Guide*.

 **Sketch**

Select this option to sketch the fitting in the Draft 2D environment. The **Sketch** option is available only when you select a structural fitting that can be sketched, such as **Wall Attached**. For more information, see **Sketch Options** below.

Sketch Options

 Sketching Plane

Specify the sketching plane for the fitting. This is the first step in defining the fitting.

 **Add Intersecting Item**

Select objects in the model that intersect the sketching plane that you want to use as reference geometry. These extra objects appear in the Draft 2D environment.

 **Add Projection Item**

Select objects in the model that do not intersect the sketching plane that you want to use as reference geometry. These extra objects are projected onto the sketching plane and appear in the Draft 2D environment.

 **Sketch 2D**

Activates the Draft 2D view.

 **Coincident Plane**

Specifies that you want to sketch on the plane that you select. For more information, see *Define a coincident plane* (on page 12).

 **Offset from Plane**

Specifies a sketching plane that is offset from a plane that you select. If you choose this option, you must define the offset distance. For more information, see *Define an offset plane* (on page 13).

 **Angle from Plane**

Specifies a sketching plane that is at a specified angle from a plane that you select. If you choose this option, you must define an axis of rotation and the angle or slope. For more information, see *Define plane using angle from plane* (on page 14).

 **Plane by Point & Vector**

Specifies the sketching plane using two points to define a vector normal to the sketching plane and a third point to define the sketching plane position along the vector. For more information, see *Define a plane using a point and a normal vector* (on page 14).

 **Plane By Three Points**

Specifies the sketching plane using three points that you specify in the model. For more information, see *Define a plane using three points* (on page 16).

Plane By Vectors Normal

Defines a plane normal to a selected plane, and coincident with a vector between two selected points. For more information, see *Define plane by vectors normal* (on page 16).

Maintain the relationships on the plane with its definition method

Maintains the relationships of the plane to the definition method and the geometry used by the definition method. For example, a plane created with **Offset from Plane** maintains the relationship of the selected plane and the **Offset** value. Otherwise, this option disables the relationships of the plane to allow moving of the plane.

NOTE When you copy a bracket and use **Edit > Paste > Delete Optional** to remove a boundary, **Maintain the relationships on the plane with its definition method** is not visible. You must first click **Select Bracket Supports** to allow the command to determine the applicable options.

Offset

Specify the offset distance for the sketching plane from the selected plane. You can specify the offset dynamically in graphics or by typing the distance. The **Offset** option is available only when you use the **Offset from Plane** option.

Angle

Specify the angle at which to place the sketching plane relative to the selected plane. You must define the axis of rotation using two points before you can define the angle. The **Angle** option is available only when you use the **Angle from Plane** option.

Step

Specifies the offset or angle step.

Select Vector

Select the vector normal to the sketching plane. This option is available only when you use the **Plane by Point & Vector** option.

Define Point

Specify the point along the vector at which to place the sketching plane. This option is available only when you use the **Plane by Point & Vector** option.

Define Point 1

Specify the location of the first of three points that defines the sketching plane. This option is available only when you are using the **Plane By Three Points** option.

Define Point 2

Specify the location of the second of three points that defines the sketching plane. This option is available only when you are using the **Plane By Three Points** option.

Define Point 3

Specify the location of the third of three points that defines the sketching plane. This option is available only when you are using the **Plane By Three Points** option.

Select Plane

Select the plane to which your sketching plane is to be normal. This option is available only when you are using the **Plane By Vectors Normal** option.

Select First Point

Specify the location of the first vector point. Your sketching plane is parallel to this vector. This option is available only when you are using the **Plane By Vectors Normal** option.

Select Second Point

Specify the location of the second vector point. Your sketching plane is parallel to this vector. This option is available only when you are using the **Plane By Vectors Normal** option.

What do you want to do?

- *Place a hole cut and hole fitting using rules* (on page 68)
- *Place a hole cut and an outfitting catalog hole fitting* (on page 69)
- *Place a hole cut and structural hole fitting* (on page 71)

Place a hole cut and hole fitting using rules

1. Click **Hole Cut and Fitting**  on the vertical toolbar.
2. Select a hole trace.
3. Click **Accept**  .
4. Click **Finish**.

Place a hole cut and an outfitting catalog hole fitting

1. Click **Hole Cut and Fitting**  on the vertical toolbar.
2. Select a hole trace.
3. Clear the **By rule** box.
4. Select **More** in the **Fitting Type** field.
5. Select a catalog fitting in the **Part Browser**.
6. Click **OK**.
7. Select a parent system in the **Parent** field.
8. Click **Finish**.

Place a hole cut and structural hole fitting

1. Click **Hole Cut and Fitting**  on the vertical toolbar.
2. Select a hole trace.
3. Clear the **By rule** box.
4. Select a fitting in the **Fitting Type** field.
5. Select a catalog fitting in the **Part Browser**.
6. Click **OK**.
7. Click **Finish**.

NOTES

- The plate part containing the hole cut is the parent of the structural hole fitting.
- You cannot modify hole cut properties, flip the hole fitting, or modify hole fitting properties when placing a hole cut and a fitting at the same time. Modify the hole cut and fitting separately after placement. For more information, see *Modify a hole cut* (on page 55) and *Modify a hole fitting* (on page 63).

SECTION 8

Manage Holes

Activates the **Hole Management** dialog box, which you can use to query the status of holes. This command is also available from a menu: **View > Hole Management**.

See Also

Hole Management Dialog Box (on page 72)
Hole Management (on page 7)

Hole Management Dialog Box

Queries the status of hole traces and displays hole trace attributes and relationships. All attributes and relationships are read-only. Select hole traces to highlight them in a graphic view and the **Workspace Explorer**.

You can sort the hole trace list by clicking a column heading, similar to sorting files in the detailed view of Windows Explorer. By filtering the column data, similar to filtering in Excel, you can limit the number of hole traces that appear on the dialog box. If needed, the dialog box size can be adjusted by dragging an edge of the dialog box.

Column Filters

Select the button on a column to filter the hole traces based on data in that column. For example, you can filter the hole traces to display by Hole Status.

- **Filter (All)** - Turns off any custom filtering that you have defined for the column and displays all occurrences.
- **Filter (Custom)** - Defines custom filtering criteria that you can apply to the column data. Only hole traces that meet the specified filtering criteria appear. You can use the asterisk [*] wildcard to match multiple characters. For more information, see *Custom Filter Dialog Box* (on page 74).
- **Filter (Top 10)** - Displays ten hole traces in the list.
- **Filter (Column Listing)** - Displays all the values in this column. Select one of the column values to filter the results by that value.

Name

Displays the name of the hole trace. The name is specified on **Hole** tab of the **Hole Trace Properties** dialog box.

Application

Displays the discipline associated with the hole trace. For example, if the hole trace is the result of a pipe penetrating a structure, then Piping appears. Similarly, if the hole trace is the result of a HVAC duct, then HVAC appears.

Hole Status

Displays the current status of the hole trace. The status is specified on **Configuration** tab of the **Hole Trace Properties** dialog box.

Hole Fitting Type

Displays the type of hole fitting associated with the hole trace. Displays **No Fitting** if no hole fitting has been placed. The fitting type is specified on the **Hole Fitting Ribbon**.

Permission Group

Displays the name of the permission group to which the hole trace belongs. The permission group is specified on **Configuration** tab of the **Hole Trace Properties** dialog box.

Creator

Displays the user name that created the hole trace.

Cut Exists

Displays **TRUE** if a hole cut has been placed. Displays **FALSE** if a hole cut has not been placed.

Fitting Exists

Displays **TRUE** if a hole fitting has been placed. Displays **FALSE** if a hole fitting has not been placed.

Modified Date

Displays the date the hole trace was last modified.

Structure Name

Displays the name of the structural system on which the hole trace is placed. Structure name is also specified as the **System name** on **Structure** tab of the **Hole Trace Properties** dialog box.

Notes

Displays the additional notes specified for the hole trace. Note text is specified on **Notes** tab of the **Hole Trace Properties** dialog box.

Number of holes

Displays the number of hole traces based on different criteria.

- **Total** - The total number of hole traces in the current workspace of the model.
- **Approved** - The total number of hole traces with **Approved** status and visible with the current **Column Filter**.
- **Reviewed** - The total number of hole traces with **Reviewed** status and visible with the current **Column Filter**.
- **Working** - The total number of hole traces with **Working** status and visible with the current **Column Filter**.

Select All

Selects all hole traces listed in the dialog box. Selected hole traces highlight in a graphic view, the **Workspace Explorer**, and the dialog box list. You can also select individual hole traces by selecting the row in the list.

Close

Closes the dialog box.

Custom Filter Dialog Box

Sets a custom filter for the column on the **Manage Holes** dialog box.

Filter

Type text for the filter. Only holes that meet the specified text appear in the column. You can use the asterisk [*] wildcard to match multiple characters.

See Also

Hole Management Dialog Box (on page 72)
Manage Holes (on page 72)

SECTION 9

Check Manufacturability

Tools > **Check Manufacturability** (**Tools > Check Hole** in the **Hole Management** task) analyzes objects in the current workspace and reports the objects that will be difficult or impossible to manufacture according to standards defined in the reference data.

Check Manufacturability Ribbon

Provides the following options to check that objects in the model can be manufactured and to generate production information.

Manufacturability Checking Settings

Shows the rules for the checking process. You can select any or all of the rules. For more information, see *Manufacturability Checking Settings Dialog Box* (on page 77).

Check Manufacturability

Starts the checking process. If inconsistencies are found, the message **Manufacturability errors/warnings have been encountered** displays.

Show Manufacturability Inconsistencies

Displays the objects with manufacturing issues. The list includes the issue severity, the assembly name, a description of the assembly, and the name of the rule which detected the manufacturing issue. For more information, see *Show Manufacturability Inconsistencies Dialog Box* (on page 80).

Close

Exits the command.

Submit Job

Displays a message box asking if you want to execute the repair rules subsequently. If you click **Yes**, the **Schedule Planning Check Manufacturability** dialog box displays so that you can schedule the execution of the repair rules at some other time. For more information, see *Schedule [Task] Dialog Box* in the *Batch Services User's Guide* and the *Batch Services Quick Start Guide*.

NOTES

- Learn more about SmartPlant Batch Services in the *Batch Services User's Guide* and the *Batch Services Quick Start Guide*.
- The **Submit Job** button is enabled only when Batch Services is installed and started on your computer.
- The data on objects that cannot be manufactured is stored in the session file, not in the model. Problem objects that apply to the Workspace are retrieved when you select the **Check Manufacturability** command.

What do you want to do?

Check objects for manufacturability

1. Select objects for checking in the model or in the **Workspace Explorer**.
2. Click **Tools > Check Manufacturability** (**Tools > Check Holes** in Hole Management).
3. On the ribbon, click **Manufacturability Checking Settings**  .
4. Specify the rules for the checking process.
5. On the ribbon, click **Check Manufacturability**  to start the process.
6. On the ribbon, click **Show Manufacturability Inconsistencies**  .

   A list view displays the objects that were found to have manufacturing problems.
7. Select one row of the list at a time to view the inconsistency and solution for an object.
8. Repair the object manually, or click **Repair** if an **Action Tool** is available.

Schedule check manufacturability using Batch Services

1. Select objects for checking in the model or in the **Workspace Explorer**.
2. Click **Tools > Check Manufacturability**.
3. On the ribbon, click **Manufacturability Checking Settings**  .
4. Specify the rules for the checking process.
5. Click **Submit Job**.
6. Click **Yes** to schedule the job for another time.
7. Complete the **Schedule Check Manufacturability** dialog box to configure batch processing, and then click **OK**.

   The software displays the message, "This job has been scheduled to run on the chosen server."

8. Click **OK** to dismiss the message.

NOTES

- For more information about SmartPlant Batch Services, see the *Batch Services User's Guide* and the *Batch Services Quick Start Guide*.
- After the job is successfully submitted, you can see the PlanningCheckMfcty_BatchJob.xml file in the system temp folder (%temp%). This file contains the required information to run the batch job.
- If any inconsistencies are observed during the execution of the check manufacturability rules that you selected, information about the name of the object, manufacturability rule ProgID, and repair rule ProgID are written to the PlanningCheckMfcty_InConsistencies.log file in the system temp folder (%temp%).

Manufacturability Checking Settings Dialog Box

Sets options for the **Check Manufacturability** process.

Task List

Displays the list of tasks that contains the **Check Manufacturability** rules defined in the catalog. These tasks allow you to filter the check rules based on the selected task in the **Task List**.

Rule

Select which rules to process check manufacturability against. There are different rules based on the task selected in the **Task List** option. Contact Intergraph Support http://support.intergraph.com for help with customizing the XML data file.

- The **Hole Management** manufacturability checking process includes checking the distance between hole traces; the distance between the hole trace and plate edges (outside), brackets and coamings; and the distance between the hole trace and seamlines, profiles, and openings. Because hole traces can affect the stress of the deck or bulkhead on which they are placed, it is important to check holes before cutting them. For more information about hole management checks, see Check Hole Rules in the *Hole Management Reference Data Guide*.
- The **Piping** manufacturability checking process includes software simulators for cutting, bending, and coating pipe. An XML data file controls the piping simulators. You can customize this file to reflect the requirements, standards, and equipment of your facility. For more information about piping checks, see Piping Check Manufacturability in the *Piping Reference Data Guide*.
- The **Planning** manufacturability checking process includes software simulators for planning joints, weld bevels, and slot types on structure. You can customize the planning simulators rules to reflect the requirements, standards, and equipment of your facility. For more information about planning checks, see Check Manufacturability Rules in *Planning Reference Data*.
- The **Structural Detailing** checking process includes tee weld chamfer checks based on changes to plate thickness, slot opening angles, and end cut type. For more information, see Check Manufacturability Rules in *Structural Detailing Reference Data*.
- The **Structural Manufacturing** checking process includes margin check on the same port, manufacturing plat and profile check, and shrinkage check.

ProgID

Programming ID of the rule that found the inconsistency. Matches the **Rule ProgID** of the rule on the *Show Manufacturability Inconsistencies Dialog Box* (on page 80)  .

Select All

Specifies all available rules.

Clear All

Clears all available rules. You can select rules individually in the list view by clicking the boxes beside the rule names.

Stop checking if a manufacturability error is found

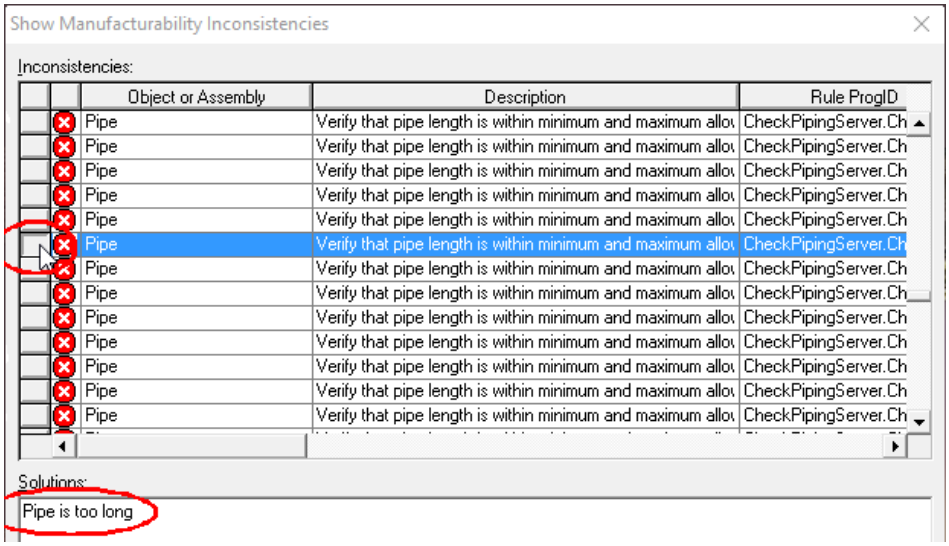
Halts rule processing upon error detection.

Show Manufacturability Inconsistencies Dialog Box

Displays and repairs inconsistencies found by the rules of the **Check Manufacturability** process.

Inconsistencies

A list view of all inconsistencies. Click the button in the far left column to see the possible solution. Solution descriptions are listed below.



Warning

A minor manufacturability problem has been found. The problem does not have to be repaired.

Error

A major manufacturability error has been found. The error must be repaired.

Object or Assembly

Name of the object with an inconsistency.

Description

Description from the rule of the inconsistency

Rule ProgID

Programming ID of the rule that found the inconsistency. Matches the **ProgID** of the rule on the **Manufacturability Checking Settings Dialog Box** (on page 77) .

Action

The type of action that is available in the software to repair the inconsistency. Blank if no software action is available and the repair is done manually.

- **COM Repair Object** - Software code that can be run.
- **SQL Script** - SQL Script that can be run.

Action Tool

ProgID of the COM Repair Object or name of the SQL Script. Blank if **Action** is blank.

Solutions

Describes the details of an inconsistency and the repair that you need to perform for one selected object from the list.

Repair

Runs the **Action Tool** to perform a repair, if one is available for the rule.

Fit

Fits one or more selected objects from the list view in the active graphic view.

Clear

Clears all inconsistencies and closes the dialog box. You must click **Check Manufacturability**  again to display the remaining inconsistencies.

Piping Inconsistencies Solution Messages

Pipe and Spool Length Messages

Pipe is too long

Pipe exceeds standard ordering length for pipe of this size, as defined in the pipe catalog. For bent pipes the length check includes any extra pipe that had to be added at the ends or between bends for clamping (see "Extra pipe must be added at end…" and "Insufficient straight pipe between bends…" messages below.). If the pipe is bent, the elongation of the pipe during bending will be taken into account when reporting this error.

Pipe is too short

Pipe length is less than the company standard for pipes welded on both ends.

Spool is too long

The overall length of the spool exceeds company standards. The length is measured along the main axis of the spool.

Spool is too wide

The "width" in the spool is measured perpendicular to the main axis. This message indicates that the width exceeds company standards. Checks for surface treatment tank size are done separately.

Pipe Bending Messages

Bend angle too large

A pipe bend exceeds the maximum bend angle that the bending machine can make.

Bend angle too small

A pipe bend angle is less than the company standard for bends. That is, the pipe is almost straight.

Bends have different radii, not allowed

Pipe has two or more bends, and they do not all have the same bend radius specified.

Bend radius too large or points too close together

The pipe geometry is physically impossible. This is an extreme case of the "insufficient straight pipe between bends…" problem. This problem may be fixed by moving a bend or using a smaller bend radius.

Extra pipe must be added at end, pipe end too short for bending machine to clamp onto

The bending machine needs a sufficiently long straight section at the start and end of the pipe to clamp onto (start), and support (end). This is a warning; bending can be done with a longer piece of pipe, with the extra pipe cut off afterwards.

Insufficient straight pipe between bends for bending machine to clamp onto

The bending machine needs a sufficiently long, straight section between bends to clamp the pipe. This problem may be fixed by moving a bend, by using a smaller bend radius, or by splitting the pipe and putting a joint between the bends.

No pipe bending machine for pipe diameter and bend radius

None of the pipe bending machines listed in the pipe shop XML data file have bend dies listed for the pipe diameter and bend radius of this pipe.

Pipe hits machine or floor during bending

The pipe cannot be bent because the free end or part of the pipe would hit the bending machine or the shop floor during bending. The simulator will have evaluated bending the pipe starting from either end before reporting this error, and will have checked all available bending machines with bend dies of the right size.

NOTE If the pipe has flanges on either end, and the **Flange Welding** check option has been selected, the simulator also checks for attached flange (if any) hitting the machine during bending.

Pipe and Spool Complexity

Too many bends in pipe

The number of bends in the pipe exceeds the company standard. This limit is normally set to maintain dimensional accuracy standards because of accumulated error during bending.

Too many branches

The number of branches off of a main exceeds the company standard limit.

Too many planes in spool

The spool is difficult to fabricate because it is geometrically complex. That is, the number of independent planes exceeds the company standard for spools.

Treatment Tank

Spool too large for treatment tank

A spool that requires galvanization or other tank treatment is too large for the tank.

No treatment tank found for <treatment_name> required by pipe spool

No treatment tank has been given in PipeBenders.xml for the treatment type called out by the pipe specification. This is an error in the editing of the PipeBenders.xml file, not a design error in the piping.

Individual pipes in spool require different tank treatments

A pipe spool is composed of multiple pipes that reference different pipe specs, and those pipe specs call out different, conflicting tank treatments.

Flange Welding

Flange hits machine or floor during bending, weld after bending

Flanges cannot be welded on the pipe before bending because they would hit the bending machine or the shop floor during bending. The simulator will have evaluated bending the pipe starting from either end before reporting this error, and will have checked all available bending machines with bend dies of the right size.

Pipe too long for automatic flange welding

This is a warning that a straight pipe with flanges on one or both ends is too long to be put through the automatic flange welder, and must be manually welded.

Pipe too short for automatic flange welding

This is a warning that a straight pipe with flanges on one or both ends is too short to be put through the automatic flange welder, and must be manually welded.

Inside Grinding and Painting

Pipe too long for inside coating

A pipe requires internal coating, but the pipe is too long for the available Pipe Internal Sprayer.

No internal sprayer found for inside coating

A pipe requires internal coating (as defined in the pipe spec entry in the XML file), but there is no Pipe Internal Sprayer available for the required coating material or for the pipe diameter.

Inaccessible for internal coating

A pipe that requires internal coating after bending has two or more bends. The sections between the bends are inaccessible for coating.

Bend on branch not allowed

A branch weld is inaccessible for grinding after welding because of a bend in the branch pipe.

Branch too far from end of main

Grinding cannot be done on a branch connection because it is too far from the end of the pipe.

Planning Inconsistencies Solution Messages

First Meet Check

First Meet assembly does not match the Planning Joint assembly

The planning joint is not located under the assembly containing the parts joined by the planning joint.

Hierarchy Check

Planning joint is not in an assembly that contains the two joined parts

The planning joint is located neither under the assembly containing the parts joined by the planning joint nor under a parent assembly/block of the assembly.

Physical Connection Check

Weld name is unknown

The weld bevel of a physical connection is not known because of a change to its associated planning joint.

Production Equipment Check

Production Equipment is not assigned to the assembly

The assembly has no production equipment assigned or the assigned production equipment is not compatible and cannot perform the weld.

Weld Side Check

The Weld Side of the Planning Joint is incorrect

The weld side of the planning joint is incorrect.

Glossary

abaft

Toward the stern of a ship, behind, further aft than.

abstract part

A part that is only defined by a partial specification and that cannot be materially provided by the organization that defines the specification.

access holes

An opening cut in the structure of a ship to permit entering or leaving various compartments.

Active Template Library (ATL)

Set of class templates and wizards supplied with Microsoft C++ Version 5.0 and later. You can use an ATL when you create ActiveX controls and any other type of object that uses the Component Object Model (COM) model. Using an ATL is generally preferred over Microsoft Foundation Classes (MFC), because the implementations are smaller, easier to use, and more closely tied to the COM model.

aft

Toward, at, or near the stern.

after body

The hull from aft of the midship section.

aftermost

Nearest the stern.

angle

The circular measurement taken from the intersection of two pipes at a turn or branch.

approval state

Recorded state of acceptance of information contained in objects within the database. The approval states indicate a level of confidence in the information stored in the database and govern your ability to alter specific data about a product.

arrangement (accommodation)

Those components of a system arranged in three-dimensional space with accurate dimensional representation for installation. Various types include electrical, HVAC, machinery, outfitting, and piping.

attribute

A single type of non-graphics information that is stored about an object such as diameter or end preparation.

axis

An imaginary line used to define the orientation of a system or object normally defined in terms of an x-, y-, and z-axis. Some 3-D graphic objects have an associated axis used to define the center or axis for rotations.

basic design

Engineering definition of the model and its systems.

bill of material (BOM)

Hierarchical decomposition of a product into constituent assemblies and parts. Specific types of BOMs exist (for example, an EBOM is a bill of material from the point of view of an engineering department; an MBOM is a bill of material from the point of view of manufacturing).

built ships

Complete database of NGC information after completion of the ship contract.

bulkload

The process by which reference data in Microsoft Excel workbooks is loaded into the Catalog database.

catalog

Repository of information about components and materials used in construction. When you use catalog parts in the model, the software places an occurrence of the catalog part in the project. This occurrence is a copy of the actual catalog part.

Catalog database

The database that contains the reference data. Each model database can reference a different Catalog database.

ceiling

Overhead design of the cabin area, including distribution systems for power, water, and ventilation.

center flange

A plate that is fitted to ensure the tightness of a wall or deck where outfitting parts pass through a structural part.

chain

A set of continuous and tangent segments.

change history

Process of recording information such as who, when, and why for any given modification.

change management

Software features or manual procedures for managing the consequence of change. For example, software can support a change management feature to report drawings that need updating as a result of a change in a 3-D model.

change propagation

Ability of the software to intelligently modify dependent design information to reflect change in a higher order object.

class

Grouping of individual objects that share some very significant, common characteristics.

class rule check

Verification that the developing design meets the rules of a particular classification society, such as ABS, Lloyd's, or DNV.

Class Rules

Classification Society Design Rules.

classification folder

A folder in the Catalog hierarchy that contains part classes. Classification folders are one level above part classes. The ClassNodeType and R-ClassNodeDescribes sheets in the Microsoft Excel workbooks define the classification folders.

coaming

A raised frame or plate around a hole or at the edge of a plate. A coaming is installed to make a watertight seal or to reinforce the structure. It can also be used to prevent the edge of a hole from damaging the penetrating part.

codelist

A set of acceptable values for a particular property that can be referred to by an index number or selected in a combo box. For example, the codelist for the material specification allows you to select from a set of standard entries, such as ASTM A183-F316 Stainless Steel.

commodity code

A user-defined code that provides an index to parts in a catalog.

commodity item

A standard component found in a manufacturer catalog (an off-the-shelf component).

component

Physical part that a feature generates.

concurrent access

Ability of the software to allow multiple users to simultaneously access and modify the design of a model.

consolidated tasks

A collection of tasks run in batch. For example, the software allows you to extract a set of drawings immediately or to schedule the batch extraction for a future time.

constraints

A logical restriction that controls how part symbols ports relate to each other and to reference ports. There are four constraints: parallel, perpendicular, coincident, and distance.

contract

A Work Breakdown Structure object representing a scope of work, usually performed by an external supplier. The contract is related to a project and appears in the Work Breakdown Structure hierarchy.

control point

A point that is used to control the shape of a NURBS curve or surface. Curves have a one-dimensional array of control points, while surfaces have a two-dimensional array.

coordinate

The location of a point along the X-, Y-, or Z-axis.

coordinate system

A geometric relation used to denote the location of points in the model. The most common coordinate system is the rectangular coordinate system, whereby points are located by traversing the X-, Y-, and Z-axes of the model. Normally, coordinate systems have their origin defined as 0,0,0.

cut hole

An opening in a structural part. A hole trace is used as a guide for the cut hole. Structural parts must be detailed before they can have cut holes in them.

cutting plane

A plane that cuts through an object.

damage records

Data relating to the damage and repair of structure or components that occurred during or after construction of a plant.

data interchange

Capability to output the design, or portions of the design, in a standard format for use or movement to another computer software system.

database

Repository for the product model data. The database contains information to describe individual objects in the data model and the relationships between objects as appropriate.

database backup

Process of recording a backup copy of the complete database or the incremental changes after the date that the last complete copy was created.

database break and recovery

Utilities used to restore a database after files are corrupted.

database copy

Functionality to copy large collections of model objects from one design project to another design project.

database management

Functionality related to managing a product model database.

database monitor record

Transactions that occur in order to provide database (DB) recovery after a stop in response with a minimum of lost data.

degree

The highest polynomial factor in the curve or surface mathematical definition. A line is a degree 1 curve, while a cubic B-spline is a degree 3 curve.

design alternative

Difference in a design represented by a separate version. A design alternative can be a new design prepared as a proposed change, or one of several elective options that the builder or customer selects. Each design alternative has an identification assigned so you can uniquely refer to the design alternatives.

design approval log

Record of review and approval of parts of the design.

design data auto input

Automation in loading existing design data into a new design database.

design documents

Drawings, sketches, material lists, procedures, and so forth that are generated during the design phase.

design object

Any object with properties that you can select. A design object can be related to one or more contracts of different types, but related only to one contract of a given type.

design progress check

Analysis of the content of the design to some metric unit that gives an idea of the degree of completion.

design review

Functionality to support rapid viewing of the design and markup of features with comments.

design service

Any general system services related to the design function.

design standard

Feature or object used in plant design that has been determined to the normal or approved way of accomplishing a design requirement. In the context of computer software, the term refers to computer functionality to support standards, not the standard itself.

detail schedule

Lowest level of schedule used to manage and track work progress.

distributed systems

Systems consisting of sequential parts with a distributive characteristic (for example, pipes distribute fluids, HVAC distributes air, cabling distributes power, and structure distributes loads).

distribution systems

Term synonymous and used interchangeably with the term distributed systems.

documentation

Drawings and other records that you must produce to document, obtain approval, or build the design.

drawing tool

Tool that helps in the process of creating, modifying, or manipulating objects. Examples are PinPoint and SmartSketch.

easting

A term that describes an east coordinate location in a coordinate system.

edge

A topological object that represents a trimmed curve bounded by a start and end vertex.

edge distance

The distance from the center of a bolt or rivet to the edge of a plate or flange.

equipment catalog

Catalog of equipment geometry and limited properties that the software uses to identify and visualize equipment and its placement in the model. The catalog is not the source for the total specification and ordering data for the object.

external appendages

External structure attached to the hull, such as the propeller nozzle, shaft struts, bilge keel, and so forth.

fabricate

To cut, punch, and sub-assemble members in the shop.

face

A topological object that represents a trimmed surface bounded by a loop of edges.

face plate

An edge reinforcement type that places a plate or profile at the selected plate edge.

face-to-face

The overall length of a component from the inlet face to the outlet face.

fasteners

Bolts and rivets used to connect structural members.

element

Primitive geometric shape such as a line, circle, or arc.

fence

Boundary or barrier that separates or closes off an area. To surround or close like a fence.

field adjustment

Material added to the neat design geometry of piping or structural parts to allow for fit up in the case that extra material is required due to uncontrolled variance in the manufacturing and construction process.

fire integrity

Deck and bulkhead treatments and fire and smoke blocks for fire control and retardation.

fitting (hole management)

A part that is related to a hole such as a coaming, center flange, carling, or double ring.

flavor

A different variation of a symbol. Each variation has different occurrence property values.

focus of rotation

A point or line about which an object or view turns.

full penetration weld

A type of weld in which the weld material extends through the complete thickness of the components being joined.

function points

Part of the requirements documentation, function points are the smallest granularity of a requirement statement that describe specific detailed actions that the software performs.

functional block diagram

Schematic representation of a system (piping, electrical, ventilation) showing system parts and their relationship. You use symbols to represent equipment and components. A connecting network of lines illustrates their relationship. Taken together, the symbols and the network illustrate the function of the system.

furnishings

Parts such as movable articles and fittings that normally are not associated with a system (for example, a chair).

generic specific

Object that is parametrically defined or defined to suit a family of specific parts (for example, International Standards parametrics). For example, a 100 - 200 gpm pump in the catalog can provide a general shape to appear in the model until a specific object has been identified. See also specific and specific object.

GUIDs

Acronym that stands for Globally Unique Identifiers. The software automatically creates the GUIDs sheet in the Excel workbooks when you create the Catalog database and schema. The purpose of storing GUIDs within Excel workbooks is to help you keep track of what has been loaded into the database. Storing GUIDs also helps to avoid the situation in which a replacement Catalog database causes existing models to become invalid.

hole fitting

A part that is related to a hole such as s coaming, center flange, carling, or double ring.

hole trace

A marking on a structural part to designate where a hole will be cut.

host location

The first location created for a Site. This host location is defined when the Database Wizard creates the Site database.

host server

The database server on which the Site database was created using the Database Wizard. Alternatively, if it is a restored database set, the Host Server is the database server where the Site database is restored. The Host Server in a Workshare environment contains the origin for the Site, Site Schema, Catalog, and Catalog Schema databases. Consequently, most Project Management and reference data work must take place at the Host.

initial design

Early stage of design work, generally before contract, used to estimate construction costs and provide a rough concept of the intended plant. Contains information relating to a plant created during its initial (concept) design period.

initial structural plan

Principal structural plan for the plant; also called a construction profile.

instantiation

Occurrence of a catalog object at a specific geometric location in the model.

interference checking

A process that identifies possible collisions or insufficient clearance between objects in the model.

job order

Industrial authorization for accomplishing work; synonymous with a work order.

joiner

Non-structural bulkheads, and trim and built-in furnishings.

kinematics analysis

Analysis of mechanical motion.

ksi

Kips per square inch.

leg length analysis

Preferred term is welding length analysis.

library

Resource of reference information that you can access in developing a plant design.

life cycle database

Information developed to assist in the maintenance and modernization of delivered plants.

link

Way to store information about another file in your document. You can update a link so that changes in the file appear in your document.

lintel

A horizontal member used to carry a wall over an opening.

load group

A grouping in which all components feature uniform load limits and stress safety characteristics. For example, if a pipe clamp from load group 5 has a maximum nominal load of 20kN, then so does a threaded rod from load group 5.

location

A Location is defined by three user-defined inputs: 1) a unique name, 2) a unique name rule ID, and 3) the server where the Site databases reside for that Location. A Location is defined and created when the Site database is created using the Database Wizard. Additional Locations can be created in the Project Management task. Each Location is a Site-level object, thus other Plants within the same Site collection can use the Locations when the Plants are configured for Workshare.

logical member

An object in the model used to represent the design topology.

machinery

Major pieces of equipment installed in a plant.

macro

A sequence of actions or commands that can be named and stored. When you run the macro, the software performs the actions or runs the commands. You can create the macros in Visual Basic or other OLE-aware programming applications. Some of the other OLE-aware programming applications are Visual Basic for Applications, Visual C++, and so forth.

maintenance envelope

A rectangular box around the part for clearance during maintenance operations.

maintenance parts

Required material for depot or on-board repair or overhaul of equipment, as determined by engineering study. Generally at a level below the purchased construction object of the plant.

maintenance records

Records of breakdown, repair, and overhaul of equipment.

material analysis

Analysis of a completed design work for extracting detailed material requirements; also called material lists.

material list

An option category that controls the format and content of the bill of materials.

methods

Objects in the database that describe the manufacturing methods to the component parts of a plant.

move from point

Starting point for an action. For example, when you move an equipment object, the Move From point determines the point of origin for the move.

move to point

Ending point for an action. For example, when you move an equipment object, the Move To point determines where you want the move to stop.

MTO neutral file

A non-graphic output file that can be fed into a material control system. MTO stands for Material Take-Off.

natural surface

A surface without a boundary curve.

node

- One of the set of discrete points in a flow graph.
- A terminal of any branch of a network or a terminal common to two or more branches of a network.

- An end point of any branch or a network or graph, or a junction common to two or more branches.

northing

A term that describes a north coordinate location in a coordinate system.

nozzle

A piping connection point to a piece of equipment.

nozzle standout

The shortest allowable distance between the connection point of a nozzle and the start point of a turn on the leg connected to the nozzle.

NPD (Nominal Piping Diameter)

The diameter of a pipe.

object

A type of data other than the native graphic format of the application.

occurrence (of part or equipment)

Instantiation of a part of equipment in the model that refers to the part library; an instance of a specific object. The design can be built several times, and therefore the occurrence can apply to more than one hull. Typically, an occurrence points back to a specific object, either for its complete definition, as in the case of a particular valve, or for its made from material, as in the case of a steel plate part cut from sheets. Thus, when a designer selects a component from the catalog and places it at a location in the space of the plant, the software creates an occurrence of that object in the plant design.

occurrence property

A characteristic that applies to an individual object in the model. Occurrence properties are designated with 'oa:' in the reference data workbooks. You can view and modify occurrence properties on the Occurrence tab of the properties dialog boxes in the software. Depending on the object, some occurrence properties are read-only.

origin

In coordinate geometry, the point where the X-, Y-, and Z-axes intersect.

origin point

The point at which the coordinate system is placed, providing a full Cartesian coordinate system with positive and negative quadrants. Points are placed at coordinates relative to the origin point, represented by the X, Y, and Z values.

orthogonal

The characteristic of an element consisting completely of elements positioned at 90-degree angles. A square is an orthogonal element.

orthographic

A depiction of an object created by projecting its features onto a plane along lines perpendicular to the plane.

P&ID

Diagram that shows the topology, functional components, and special requirements of a piping system; generally represents the engineering design of the system.

package

Set of closely related classes. (UML)

painting

Computation of paint surface and recording of paint system requirements.

parameter

A property whose value determines the characteristics or behavior of something.

part class

A group of similar objects. You can define part classes in the Excel workbooks. A part class can have multiple parts. For example, a heat exchanger part class can contain heat exchangers with different dimensions.

part number

Unique identifier of a part.

PDS (Plant Design System)

A comprehensive, intelligent, computer-aided design and engineering application for the process, power, and marine industries. PDS consists of integrated 2-D and 3-D modules that correspond to engineering tasks in the design workflow.

physical occurrence

Unique specific object that has traceability and is the physical manifestation of an occurrence object. A physical occurrence applies to one and only one hull. It is a version of its occurrence object with as-built or as-modified differences included and has a serial number or lot number.

PinPoint

Tool that allows you to place, move, and modify elements with precision, relative to a reference point.

pipe sleeve

A part that fits over pipe passing through a hole. A sleeve can be used to prevent water from leaking through the hole.

principle of superposition

The principle that states that the stresses, strains, and displacements due to different forces can be combined. This principle is only valid for linear analysis.

product

Data objects that describe the components of a ship and any corresponding properties. An individual object or part (or its representation in the product model) that may be installed in the ship. Examples of individual products include objects such as a coffee urn, a light fixture, a piece of pipe, a piece of ventilation duct, a radar display console, a bulkhead plate, and a structural profile stiffening a bulkhead.

Product Data Management (PDM) System

Software intended to manage both product data and documents associated to the product data. Functionality typically includes: object-based data modeling tools, user administration, business rules, and document management. Document management typically includes document editing or reviewing, document mark-up or redline, document storage, and full-text retrieval.

product structure

Hierarchical breakdown or decomposition of a product into constituent parts, volumes, or units. (For example, a bill of material is one possible type of product structure.)

production planning

Functionality associated with the work breakdown and sequence of the construction of a plant.

promotion

Process of associating approval state with a product version. A product version begins its existence at a working approval state. When the version is at some level of maturity, its approval state is elevated to a higher approval state (that is, promoted). Then, further changes must be carefully controlled and generally require the data set demoted to a working state. One or more promotions can occur successively higher approval states (between working and approved) to represent various intermediate levels of review or progressive approval.

query select sets

Set of objects that are selected in a query or queries on the database.

reference data

The data that is necessary to design plants or ships using the software. Reference data includes graphical information, such as symbols. It also contains tabular information, such as physical dimensions and piping specifications.

resource estimation

Rough estimate of material, manpower, and facility utilization for the design and construction of the plant.

route

1) A line connecting a series of points in space and constituting a proposed or traveled route. 2) The set of links and junctions joined in series to establish a connection.

satellite server

The database server where the replicated databases reside for Workshare. The Satellite Server is not used unless Workshare is activated.

schema

A database that creates the structure of another database. For example, a schema specifies the queries, tables, fields, and data types in a database.

schema update utility

Functionality used to assist in processing existing product models to an updated database structure after you modify or add to the database structure.

sheetbody

A topological object that represents a collection of faces joined along their common edges (stitched).

shell structure

External portion of the surface of the plant.

ship

A collection of modeled objects that can be simultaneously displayed and edited in a workspace. A Ship points to a Catalog (optionally shared with other Ships). Access control is managed at the Ship level.

site

The top level in the Project Management hierarchy. A Site configuration may contain several Catalogs, each shared by multiple Plants.

site administrator

Person responsible for managing the standards and general parameters for a given plant site within a Site database.

site setup

Functionality associated with establishing a new plant site or hull for design development.

sketch and trace

User interface for rough definition of a required design feature that typically works in a 2-D mode.

sleeve

A part that connects two pipes or two ducts, for example. A sleeve can be used to prevent water from leaking through a hole.

specials

An option category that allows you to control specialized calculations for equipment trim, repeatability, and center-of-gravity.

specifications

Contracted requirements for the plant.

steel outfitting

Internal structural elements of a ship that are required to meet a local requirement such as foundations, non-structural bulkheads, walkways, and so forth.

stern frame

Casting and structure that support the rudder and shaft opening.

stud

A bolt, threaded on both ends, used to connect components.

suspended floor

A concrete floor system built above and off the ground.

swash bulkhead

A longitudinal or transverse nontight bulkhead in a tank that decreases the swashing motion of the liquid contents. A plate in a tank that has this same effect but that does not extend to the bottom of the tank is called a swash plate.

symmetric node

Type of vertex on a curve. A curve with a symmetric node has the same curvature on each side of the node. A handle can be attached to a symmetric node for editing.

system

A conceptual design grouping that organizes parts in hierarchical relationships. A system represents a functional view of the model and includes information such as system name, type, properties, and design specifications for the objects assigned to the system.

tag number

User-specific, unique number assigned to an object (for example, CV-101 for a control valve, HE-2002 for a heat exchanger).

target point

The origin for coordinate measurements displayed by PinPoint. You can position the target point anywhere on the drawing sheet or view.

tolerant geometry

A type of ACIS geometry - either an edge or a vertex - that is outside the tolerance for ACIS and requires special handling.

transverse

At right angles to the fore-and-aft center line.

transverse frames

The athwartship members that form the ribs of the ship.

trim

The difference between the forward draft and the aft draft.

trimmed surface

A surface whose boundary is fully or partially inside the "natural" geometric definition of the surface. Some or the entire control polygon extends outside the face boundary.

trunk

Feature that quickly reserves space for the distributive systems and other systems that have a path. Along the trunk are stations that define the cross section and identify part or system membership.

tumble home

The inboard slope of the side of a ship, usually above the designed waterline.

unit/module modeler

Facility of the system to structure collections of equipment and components into a single identifiable object.

user attributes

A customized property in the reference data. The Custom Interfaces sheets in the Excel workbooks define these properties. You can list the customized properties on the individual part class sheets.

version control

Ability of the system to manage multiple versions of a single part of the design. Version control should support conditional analysis and promotion status, as well as alternate design features among hulls within a plant site.

vertex

A topological object that represents a point in the three-dimensional model.

vertical keel

A row of vertical plates extending along the center of the flat plate keel.

viewset

Set of objects (usually a subset of the entire database) that a view operation uses. Membership or lack of membership for any object in a viewset does not affect the actual stored representation of the object, but only its availability or desirability for viewing in the current scenario.

water line

A line parallel with the base line that depicts the water.

watertight door

A door that when closed prevents the passage of water.

weather deck

A deck exposed to the weather.

weathertight door

A door that when closed prevents the passage of rain and spray.

weight and CG analysis

Routines that compute the weight of commodity materials as configured in a given design (for example, plate and pipe) and determine total weight and center of gravity (CG) for a collection of material and equipment, as well as the complete plant.

welding

Weld requirements for joining materials. Welding length analysis is the calculation of required weld dimensions; also called leg length analysis.

windlass

The machine used to hoist and lower anchors.

wirebody

A topological object that represents a collection of edges jointed at their common endpoints.

wizard

Software routine attached to an application that provides guidance and expert help to you to complete one of the functionalities of the application.

work content

Estimation development of metrics from the database that relates to the work hour content of the various construction units.

work order

Plant authorization for completing work; synonymous with a job order.

working plane

The available 2-D plane of movement for endpoint selection.

workset

Set of objects (usually a subset of the entire database) used in an interactive change, add, or delete operation. Membership or lack of membership for any object in a workset does not necessarily affect the actual stored representation of an object. However, you can change or delete an object in a workset that also results in a change or deletion of the stored object. Similarly, when you add a new object (not currently stored) to a workset, the software also adds the object container.

workspace

Area that represents the portion of the model data needed to perform the intended task and includes the user modeling settings.

workspace document

Document into which you can extract a portion of the model data for a user task.

Workspace Explorer

Tree or list representation of objects in your workspace.

Index

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W